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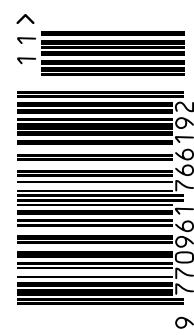
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OK, few of us can afford a pair of Tannoy Westminster – and perhaps few of us would want to. Their size and styling are not – er – current idiom, shall I say. But what the heck. They're still fabulous devices, almost barking mad in the way they seemingly ignore every sensible modern constraint to deliver a fabulous sound. £28k and 140kgs or not, we had to get them in for review – and you can read the result on p10. I hope it brings a smile to your face!

I would like to say the same thing for our Raspberry Pi sound card review on p55 but I know that many readers just do not like computers in any size, shape or form. And I understand. They often annoy me too, even though I've been building the darn things for decades now and am no computer virgin.

Worse, although a lot of young people use them to dangerous distraction, they have little interest in what goes on inside – and this is where Raspberry Pi becomes a tad political. It is meant to be a platform for teaching the young about computers and computer programming, to give Britain a future generation able to profit from tomorrow's technologies. Whilst Pi in itself is a fabulous piece of technology, I'm less certain that the Pi experience is going to appeal to anyone not already conversant with computers; you have to know about Pi before you can use it – a somewhat contradictory situation. I guess it's aimed at the classroom.

All the same, we tackled Pi and were ultimately impressed. Happenstance (I like that word) delivered an e-mail to us of a reader's experiences with Pi to help expand the picture – see p34 Letters. So some love Pi!

The Entotem Plato is a fascinating new music source, newly designed in the UK, that aims to make even LP easily accessible on a modern streaming system. It gave me a fright: I played an LP and a picture of the album cover suddenly popped up on its screen. Where did that come from, I wondered in amazement? You can find out more about this on p42 The world is becoming a clever place!

Martin Pipe reminds us of all our yesterdays on P91 where he covers quadrasonic transmission that needed two transmitters. Really? Even the BBC did it. You can see why the 1970s were the glory days of audio; no one would consider that right or normal nowadays. Audio can be surprisingly wacky and perhaps that describes some of what lies in this issue! I hope you enjoy it.

Noel Keywood,
Editor.



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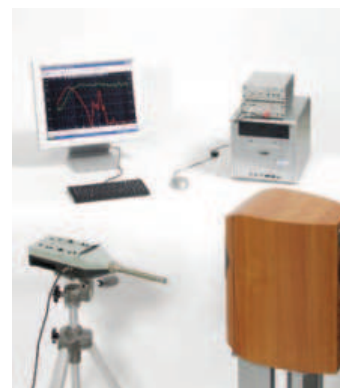
testing (see www.hi-fiworld.co.uk for full explanations of all our tests)

To ensure the upmost accuracy in our product reviews, *Hi-Fi World* has extremely comprehensive in-house test facilities, and our test equipment - from big names like Rohde & Schwarz and Hewlett Packard - is amongst the most advanced in the world.

Loudspeakers are measured using a calibrated Bruel & Kjaer microphone feeding a Clio-based computer

analyser, using pulsed and gated sinewaves, in a large room to eliminate the room's influence. Pickup arm vibration is measured with a Bruel & Kjaer accelerometer.

No other UK hi-fi magazine has in-house testing, and none has access to such advanced tests across all types of equipment. That's why you can depend on *Hi-Fi World* reviews.



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Audio Cable Award Grand Slam

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"But perhaps their reticence is understandable when the product sounds as good as this – after all, why let others in on the secret? Used in a variety of systems the Black Diamonds consistently revealed a wider perceived bandwidth, bigger soundstage and the ability to present transient details in an effortless fashion"

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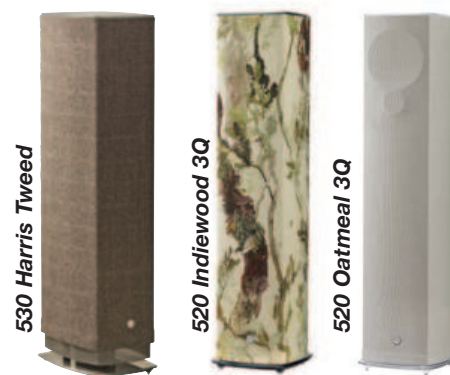
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LINN SERIES 5 MUSIC SYSTEMS

New from Linn are the Series 5 active speakers, which employ the Glaswegian firm's unique Exakt digital signal-path technology. Customisation of these speakers goes beyond Exakt's 'space optimisation', though. They feature Linn Fabrik – a covering whose acoustic properties can be accommodated by the electronics inside. Linn reckons that as a result of this development, aesthetics need no longer compromise sound quality. A wide variety of Fabrik coverings – from designers Timorous Beasties and Harris Tweed – are available to complement a room's décor and Linn hasn't ruled out a 'bespoke' service for customers in future. The 20-litre 520 Exakt active speaker boasts 300W of amplification and Isobarik bass-reproduction principles. Its bigger brother, the 530, is built into a 30-litre enclosure. Both interface to an Exakt player 'hub', such as the Akurate DSM. Pricing of the resulting systems starts at £9,250. Linn has also announced that it will be retrofitting more third-party speakers for Exakt compatibility. The KEF Reference 500 and PMC Twenty26 now join previously-considered models like the Kudos Super 20 and B&W Nautilus.

Call 0500 888909 or visit www.linn.co.uk



CHORD COMPANY CLEARWAY

The Chord Company has launched Clearway, a low-cost speaker cable that replaces the Carnival Silver Screen.

It borrows key ideas from recent development projects and uses FEP: a derivative of PTFE with very similar performance characteristics. The FEP-insulated conductors are built from multi-strand oxygen-free copper and are arranged in a twisted-pair configuration to reduce interference. The two conductors are then protected with a layer of soft PVC (which was chosen over polyethylene because of its flexibility), in order to correctly space the shielding in relation to the conductors and to minimise any mechanically induced noise.

Chord Clearway speaker cable features two contra-wound high-density foil shields. Finally, a clear protective PVC jacket is applied.

Price is £10 per metre, unterminated with various factory termination options available. To learn more, call 01980 625700 or go to www.chord.co.uk.



AUDIOLAB 8300CD

Audiolab has announced the successor to the 8200CD and CDQ CD player: The 8300CD replaces both players.

Like its predecessor, the 8300CD is built around the Sabre32 9018 with 512 DAC elements (256 per channel) each operating at 84.672MHz. All digital audio sources, whatever the sample rate, are upsampled or oversampled to this frequency.

Around the DAC are measures to reduce jitter through the use of a proprietary, discrete master clock, in conjunction with the patented Sabre32 sample rate converter to address time domain errors (jitter) from all digital input sources.

The Audiolab 8300CD also features user-selectable digital filters in addition to the more conventional types for easy comparison. These filter settings allow the user to tune the player's performance to suit their preference, depending on system configuration, digital file quality and musical taste. The power supply incorporates thirty-four regulated supply rails including fourteen ultra-low-noise regulators, with extensive measures against power supply contamination and cross-coupling. The new release also provides an updated external design, with softened lines plus a full digital preamp functionality to the 8200CD's spec, with adjustable volume level and source selection accessible via the player's front panel and remote handset. This means that the 8300CD can be connected directly to a stereo power amp or a pair of monoblocks as well as to a traditional integrated amp.

The new 8300CD processes data up to 32bit/384kHz via USB. The USB input now also accepts DSD files. Accordingly, the filter section now includes four extra filters for DSD playback. Price is £999.95. For more information go to www.audiolab.co.uk.

TRITON FIVE

GoldenEar Technology's new Triton Five tower speaker is a larger version of their Triton Seven.

The Five's cabinet construction of non-parallel baffle, top and side walls includes a narrow front baffle in concert with a grille cloth sock and a sculpted piano-gloss black base.

Like the Triton One, Two and Seven before it, the Five utilises a D'Appolito Array of two bass/midrange drivers and GT's High Velocity Folded Ribbon tweeter. The HVFR tweeter is a variation of an accordion-like ribbon transducer - the Air Motion Transformer - invented by Oscar Heil. Rather than vibrate when current is applied, the folded HVFR ribbon works like a squeeze box: the folds squeeze and expand with the current to produce sound waves.

Above and below the tweeter, the cast-basket 203mm bass/midrange drivers are engineered for long-throw.

Like the Triton One, the Five incorporates four side-mounted 203mm sub-bass radiators (two on each side), located near the floor for optimum coupling to the room.

Price? £2000 pair

For further details call 01423 358846 or log-on to www.karma-av.co.uk.



IRON MAIDEN HEADPHONES

Metal legends Iron Maiden and Onkyo have revealed the name of their new on-ear headphone collaboration: Ed-Ph0n3s. Earlier this year a visual mock-up of the headphones was displayed on Maiden's iconic mascot 'Eddie', at CES in Las Vegas.

In the intervening months, Onkyo has worked with group founder member and bassist Steve Harris to fine-tune the product. First production samples are now available.

Ed-Ph0n3s were used by Steve Harris in the mixing of the brand new Iron Maiden studio album 'The Book of Souls'.

Price for the new headphones is yet to be confirmed.

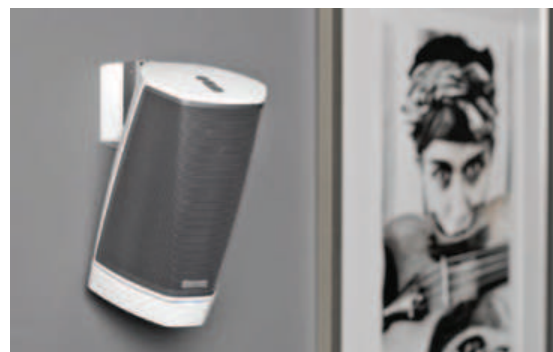
For more information click www.onkyo.com

SOUNDXTRA

British audio accessories brand SoundXtra has launched its first range of bespoke wall mounts for the Denon HEOS wireless music system, plus a multi-fit mount that'll elevate the latest streaming speakers from Monitor Audio, Samsung, Panasonic, Pure and other brands.

SoundXtra's range of four Denon HEOS wall mounts have been engineered to suit the specific features of the HEOS 1, 3, 5 and 7 speakers. Rotate, tilt and swivel functionality allows users to put their HEOS speakers in position, while further flexibility is offered by each SoundXtra mount coming with a colour-matched 3m extension power cable - so wherever you choose to place your speaker, getting power to it isn't a problem. Black and white finishes are available. Prices start from £34.99.

Click on www.amazon.co.uk for more information.



HEADSUP

New British headphone accessories brand HeadsUp has launched five contemporary stands for your headphones. Every HeadsUp stand has a cable rest around the back, too. The HeadsUp Base Stand comes with a free cradle to clip on/off to hold your phone or music player. It's available in desktop or floor stand versions and handles a wide array of models. While the Base Stand is available in gloss black, gloss red and gloss white, the Premium Stand and Premium Floorstand arrive in a chrome finish.

The HeadsUp stands are available priced £30 for the HeadsUp Base Stand; £60 for the HeadsUp Premium Stand and £100 for the HeadsUp Premium Floorstand.

For more information click on HeadsUpStand.com.

CRYSTAL ACOUSTICS

Crystal Acoustics has announced its WiSound Multiroom range of products, a series of wireless speakers and complementary devices.

The full range includes the Cuby 9 standalone wireless speaker, the Teevy 6 MR soundbase, Teevy Bar soundbar, WiSub subwoofer, the Tower 5 and Tower 6 floorstanding stereo speakers and the Monitor 1 and Monitor 8 stereo speakers. It also includes the Widaptor, a small Wi-Fi transmitter/receiver that can be attached to any pre-existing audio to incorporate your old audio products into a multi-room music network.

For more on Crystal Acoustics' WiSound technology visit www.wisound.com.



BLACK RHODIUM STORM & THUNDER

Black Rhodium has announced the launch of two new loudspeaker cables. Storm and Thunder are based on the design of the Athena loudspeaker cable. They use the same cryogenically treated cores but more of them. In basic terms, Storm is equivalent to connecting two pairs of Athena cables in parallel and Thunder is equivalent to connecting four pairs of Athena cables in parallel.

Storm and Thunder feature the GN Legacy VS-2 Vibration Stabiliser developed for the GN Legacy range of cables while both are treated with DCT++ cryogenic processing treatment. This involves temperature processing above and below room temperature. The DCT++ process alters the molecular structure of the cable to improve uniformity.

In addition to DCT++ Storm and Thunder are also treated with the Crystal Sound Process which is applied to the cable following the completed DCT++ process. It refocuses the outermost skin of the conductor.

Both use silver plated copper cores, connected in opposite directions for the positive and negative signals and are terminated with Rhodium-plated locking banana plugs

Prices? A 3m pair of single-wire Storm terminated with Rhodium-plated locking 4mm plugs, £3000, Thunder £5000.

For further information, call 01332 342233 or go to www.blackrhodium.co.uk



ASTEEL&KERN EARPHONES

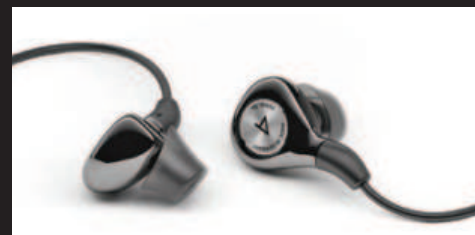
Astell&Kern has launched in-ear headphones featuring Beyerdynamic Tesla technology.

The AK Ti8e earphones are built by hand at Beyerdynamic's facility in Heilbronn, Germany and come with accessories including a leather case, detachable, Kevlar-reinforced cables and eight choices of ear-tip.

The AK Ti8e arrives powered by a ring magnet. The single-driver design omits the need for crossover filters. The earphones also come with a special connection cable, a 2.5mm four-pin plug to fit the balanced output of Astell&Kern's portable players. A standard 3.5mm cable is also included.

The earphones also come with an array of ear-tips. Five different sizes of these silicon ear-tips are included, each with an oval shape. Prefer Comply Foam Tips? The earphones come with three sets of those too in small, medium and large sizes. The earphones will be priced at £799.

Click on www.amazon.co.uk for more information.



MINISTRY OF SOUND AUDIO M PLUS AND AUDIO L PLUS

Ministry of Sound has launched its full connected range of multi-room wireless speakers. There are two new connected speakers, the Audio M Plus and the Audio L Plus (the largest speaker in the new Ministry of Sound Audio range). Both have been engineered to work together in any configuration with any number of speakers in a single multi-zone home music network.

Once in place, your chosen configuration of Audio M Plus and Audio L Plus speakers are all controllable via the Ministry of Sound Audio app (available on iOS and Android). The app delivers music streaming via Spotify Connect – with both Tidal and Deezer also to be added within the coming weeks.

The Ministry Audio app also offers instant streaming of all the Ministry of Sound Radio channels, as well as a one-touch 'Live From The Club' feature: at the touch of a button you can live stream the party from London's world-renowned Ministry of Sound nightclub every Friday and Saturday night.

Both the connected speakers also feature tap-and-swipe touch controls to change volume and skip tracks. You also get apt-X Bluetooth, NFC Bluetooth pairing and a 3.5mm auxiliary analogue input for wired connection to an external device. Price for the Audio L is £300 with £200 for the Audio M. For more details visit ministryofsound.com or call 020 7740 8600.



HRT

The new HRT dSp and i-dSp units are digital sound processors. The dSp is designed for those who use their phones, tablets, laptops and other portable devices as their primary listening and viewing platforms. The dSp will work with operating systems such as Android Lollipop, Chrome OS, Windows, Apple OS-X and others.

The i-dSp is designed for those who use their lightning connector-equipped Apple iPhone 5 or 6, iPod Touch or current iPad as their primary listening and viewing platforms and offers the same level of sound as the dSp.

The supported audio formats include MP3, AAC, FLAC, PCM, Apple Lossless and Windows Lossless (dSp only), along with all streaming audio and video formats and they are also firmware-upgradeable to accommodate future updates. The dSp and i-dSp retail for £79.

To learn more call 020 8948 4153 or log-on to www.audiofreaks.co.uk.





The Power of Westminster

Tannoy's massive Westminster Royal GR loudspeakers arrive at Hi-Fi World for review. Noel Keywood experiences their power!

If there's one word that sums up Tannoy Westminster Royal GRs, it is power. I've heard predecessors on rare occasions in the past and have in many – if not all – times been overawed by the way their sound dominated a room, seeming to drive it from the very foundations upward. But getting these giant horn loudspeakers in for a proper review, complete with measurement, was never going to be

easy – or quick. We begged for a pair years ago. Recently these rare birds finally arrived, in latest GR form.

The Westminster is one of the largest domestic hi-fi loudspeakers available. It's rare because its complex plywood cabinet is hand built at Tannoy's Coatbridge – a suburb of Glasgow – factory in Scotland. And when fitted with a single 15in Tannoy Dual-Concentric drive unit, each cabinet weighs 140kgs. The

price is equally large – £28,000 per pair. Needless to say, there aren't many around and Tannoy don't need a review because the Westy isn't a mass market product, so you'll not read much about them – even though this speaker sits at the top of their Prestige model range.

Although pictured by Tannoy in grand UK residences with castle-like dimensions and lavish furnishings, in real life Westminsters sell in greater

quantity the farther East you go, Tannoy tell me. And the farthest East is Japan in this case. There, great value is placed on traditional hi-fi products like this; the Westminsterers are not modern repros so much as part of a long lineage that goes way back to the beginnings of audio; Tannoy was founded in the 1920s. The Westminsterers are an authentic embodiment of an old idea, that of horn loading – and in spite of their size and price, sell around the world.

But Westminsterers don't sound fabulous because they are old! They sound fabulous because they are a silly-large horn loudspeaker – and a horn drives a room in unique fashion. It's why they move you with vast dynamics of seemingly unparalleled ease.

The giant 15in drive unit is coupled into the room's air load through an acoustic transformer that must, by its very nature, have a very big mouth. Horns have to be big if they are to work well, big in this case meaning a cabinet that three burly men could hardly lift or manoeuvre during delivery.

Their weight is so great they must be moved on trucks – with care! This also explains our use of Tannoy press shots in this review; we couldn't get the Westminsterers into our photographic studio!

Whilst on the subject of size I'll quickly mention that a horn is very sensitive and efficient, so contrary to what you might expect, Westminsterers need little power. Big power amplifiers are not essential; 40 Watts will do fine and you can go down to 20 Watts. The only caveat here is that we found we often played them very loud as part of the vastness of the experience and also because they are relaxed like no other loudspeaker. But more on this later, since we measured our power usage to find out exactly what was going on here, rather than speculating about it.

A dominating visual characteristic of the Westminster is that of huge width. The cabinets are nearly one metre wide, more precisely 980mm, or 38.5in. Standing 1395mm high they have a looming presence – even in our 18ft wide listening room. We ended up listening from 20ft away, in a 25ft long room, mainly for best bass. However, because the drive unit is concentric, placing a tweeter at the centre of a woofer, the Westminsterers were consistent in their sound whether we sat close or afar. Distance made no difference to



The grilles are best removed to brighten up the midband a little; in place the sound is more 'trad'. A GR key is supplied to unlock them. Behind lie treble energy and roll-off adjustment screws. In this shot is one of our Quad II-eighty power amplifiers used in this review.

the listening experience; they were as focussed and solid across their vast sound stage 20ft away as they were up close. All Tannoys are projective, a strength of the big Dual-Concentric drive unit, but the Westminsterers

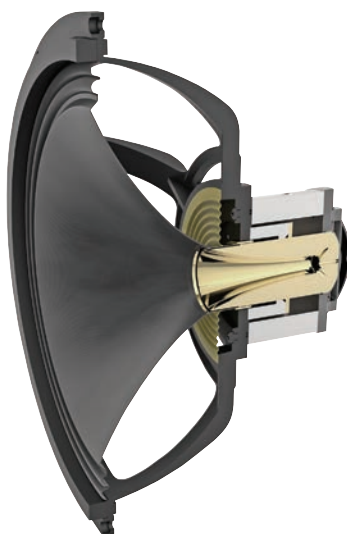
especially so because of the front horn. So a Westminster experience is an anywhere-in-the-room one: these speakers fill the space.

Because of sheer cabinet size a room smaller than 20ft x 16ft would be impractical, although there are plenty of stories about far smaller rooms being used in the Far East! What I'll mention here though is that horns shut off hard at low bass frequencies so don't go down as far as you might imagine. How far down they do go is size dependent so the Westies go so far and no further; to balance size against bass extension.

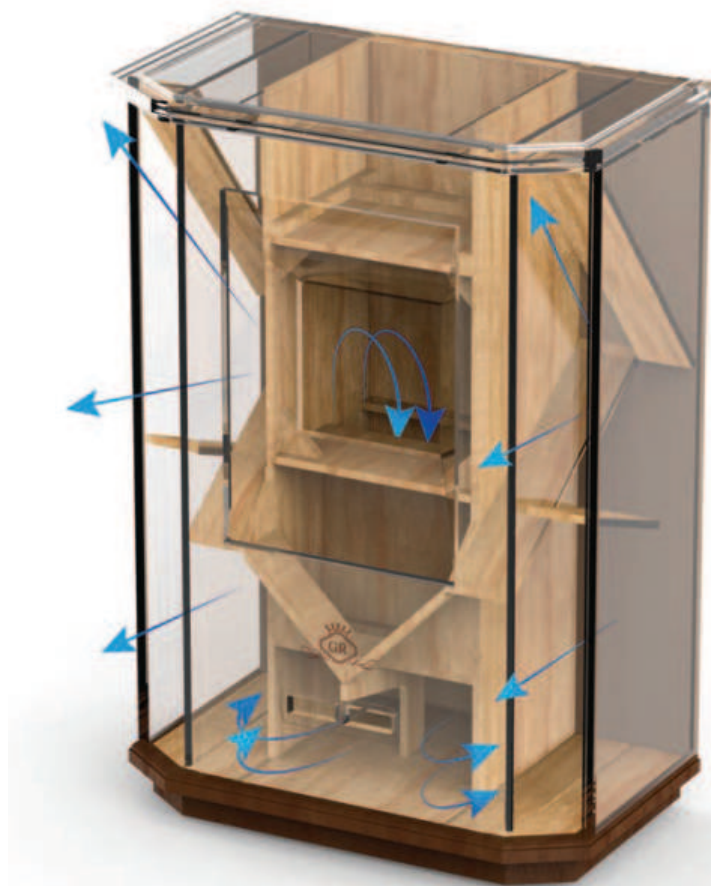
They are best near-wall positioned – with listeners at the far end of the room. This lifts low bass because – perhaps surprisingly – the Westminsterers are not bass heavy. But they are very tight, due to the enormous acoustic damping the room's air load places upon the cones through the intermediary horn.

That's another reason a Westminster sounds different; it is more tightly coupled into the listening room than an ordinary loudspeaker. This reduces cone travel and distortion and increases damping, making for an easy yet 'fast' sound that doesn't wallow around.

This property of the Westminster affects amplifier choice. We soon dispensed with various transistor amplifiers as unsuitable, in the end settling for the obvious sonic



Tannoy's 15in Dual-Concentric drive unit, used in the Westminster Royal GR. A 2in magnesium/aluminium alloy dome tweeter sits at the base of a treble horn that fires out through the centre of the bass cone. This keeps bass and treble synchronised and subjectively in focus.



The complex internal cabinetry that forms a bass horn behind the huge 15in bass cone of Tannoy's 15in Dual-Concentric drive unit. The horn mouth is split into left and right, forward-firing side ports, hidden behind fabric grilles.

choice of Quad II-eighty monoblock valve power amplifiers. They each use KT88 power tetrodes in parallel push-pull pairs to produce 80 Watts apiece. With these amps the Westminsterers opened up and bass became usefully more fulsome. It was a no-brainer, differences were so marked, yet the speakers are commonly driven by transistor amps in real life simply because they are most common – but not to their benefit. So if you win the Lottery and get to audition a Westminster, ensure it is driven by a valve amp. Valves work best at low power levels I'll note, whilst transistors work least-best at low power – and Westies need just a few Watts.

There have been Westminsterers before, five versions since 1982, but Tannoy's compound horn goes back to the 1950s Autograph. The new Gold Reference versions we received are updated with cryogenically treated (deep frozen) crossovers, hard-wired in. There are level and

cut-off adjusters for the treble horn, behind the large, removable grill, so treble can be made 'shiny' or 'easy', these adjustments being subtle in effect.

The rear panel has good, solid bi-wire WBT NextGen terminals and wire bridging links for mono-wiring. And there is Tannoy's earthing terminal that grounds the metalwork of the big 15in Monitor Gold drive units. The handbook suggests screened loudspeaker cables be used to reduce radio interference, the screen being taken to this terminal, but we used standard green multi-core connecting wire alongside Black Rhodium Athena DCT++ cables.

Tannoy label the Westminster a 'compound horn'. That means it is loaded by a horn front and back, each with a different

task, and so of different design.

There is a flared horn in front of the big 15in cone. This is a mid-range horn and helps give the speaker its lower-midrange dynamic push: just look at the size of it! The squared profile in front of a circular drive unit doesn't match well either physically or visually; a circular plastic pressing would sort-of be better, in reductionist technical terms. But it wouldn't be in keeping with the wood technology of the time that could not achieve this, so you get a square front horn instead – and it does a great job. We don't listen to loudspeakers with mid-range horns like this, and doing so is a bit of a wake up call: the average domestic loudspeaker sounds deficient by comparison.

Then there is the rear horn. This is a labyrinth behind the big bass cone that expands in cross-section steadily until it reaches the open air, in this cabinet through an array of fabric covered vents at far left and right of the cabinet's front baffle.

The cabinet is made from birch plywood, covered by a walnut veneer – real wood of course. You get a tin of wax polish in the accessories kit! The massive Tannoy 15in Dual-Concentric drive unit has a mid/treble horn with large 2in magnesium/aluminium alloy dome driver mounted at the centre of a big bass cone made from natural and synthetic fibres.

SOUND QUALITY

Tannoy recommend 20 hours running in time, but our samples came from a trendy East London bar/restaurant where they had been used nightly,



The front panel adjustment panel, hidden behind the grille. At left is Treble Energy and at right Treble Roll-off. Lift and cut are available.

from new, for at least six months, so were well run in. Happily they were in good condition; no bar-type accidents had befallen them. I de-toxed them using a Monitor Audio de-tox CD and also felt they worked best after warming up for 20 minutes or so playing music.

For sources we used an Oppo BDP-105D Blu-ray player with its notable ESS9018 Sabre32 DAC and remote volume control, running the Quad II-eighty power amps direct, to play CD and high-res digital from an Astell&Kern AK120 acting as an external digital transport.

For vinyl a Timestep Evo turntable with SME309 arm and Ortofon A95 MC cartridge were used, coupled to an Icon Audio PS3 valve phono stage, again with volume control and feeding the power amps direct.

I have already said a lot to describe in outline how the Westminster's sound because everything about this unique product is about just that – sound quality.

Firstly, the speakers are all about achieving vast scale; playing Holst's 'The Planets' put everyone in the room within the orchestra – an immersive experience. Kettle drums in 'Mars' took on massive proportions and thundered out across the room toward us, from 20ft away. Just as importantly, however, the Westminster's sounded totally relaxed whilst doing this, in a way even big floorstanders do not (I realise in retrospect).

This is the core strength of the Westminster's: vast scale coupled with supreme relaxation. I use the term 'scale' here to describe not only the size of the sound stage but the powerful dynamic contrasts of instruments upon it. Not only did kettle drums sound massive, horns blared out with a power that was arresting. It was beyond impressive. Violins were fulsome and smooth.

I'll not say the Westminster's are without weaknesses but that can be said of all loudspeakers. Images on the sound stage are a bit diffuse compared to modern sharp-imagers, notably speakers with ribbon tweeters such as the Castle Avon 5s that we reviewed recently.

Then there's some boxiness from the huge cabinet that adds a bit of bulk and warmth to the sound overall. This gives the Westminster a traditional full-bodied character, which is what you hear initially. I mention this especially because



The rear panel gives some idea of the loudspeaker's basic profile - wide! Bi-wiring terminals are fitted.

we once borrowed Westminster's for demos at a Manchester Show, working alongside B&W 800 Series studio monitors – and the general consensus from the audience when polled was that the modern sound of the B&Ws was best. It was understandable.

What I heard previously, though, listening to Westminster's in a dedicated room at Heatherdale Audio, run by Audionote Keron valve power amplifiers, was awesome beyond description! This was contradictory – I needed to spend time with the Westminster's to find out what they really were capable of.

Our Westminster Royal GRs sounded atmospheric and detailed, but they're more relaxing than challenging as a listening experience; I don't think anyone in the office worried too much about whether the last pin drop was clearly audible, rather than just enjoying an immersive musical experience that is beyond compare. At the same time this loudspeaker was able to sort out differing musical strands with eerie ability, making it very informative.

Then there's sheer bass power. With The Scissor Sisters 'I Don't Feel Like Dancing' spinning at 45rpm on the LP 'Ta Dah', the insistent background kick drum beat had massive power and drove the track along forcefully.

Spinning another favourite 45, this time a 12in 45rpm single of

Carol Kenyon singing 'Dance With Me', had the room trembling to the insistent synthesised kick-drum beat; it was like being kicked by a baby elephant.

Playing classic rock, The Eagles 'Busy Being Fabulous' from the CD 'Journey Out of Eden', showed a massively powerful and deliciously articulate bass line, where the bass drove the track with laconic ease and fluency. Glen Frey's vocals were, however, quite obviously on the warm side with the grilles on; removing them brought him forward. With a simple, atmospheric vocal track like The Creole Choir of Cuba's 'Preludio' (24/48) the Westminster's captured the haunting vocals beautifully; they dig very deep, teasing a fabulous sense of atmosphere out of this live vocal track.

I was surprised at just how exciting the Tannoys made Nigel Kennedy sound playing Vivaldi's 'Spring' – not that he isn't exciting! Nigel stood about 6ft tall at the end of the room, far from me, and his superb playing was as clean yet as vigorous as I've ever heard it; the Tannoys were temporally pure, picking out every nuance, as well as the scale of the English Chamber Orchestra in full pursuit behind him. Lovely: about the best I have ever heard this particular performance, not just because of its believable scale but also my ability to hear right into the soundstage. These are just



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exciting sounding loudspeakers.

Arcadi Volodos playing Liszt's 'Valee d'Oberman' from 'Premiere Annee: Suisse' (SACD) on a Steinway was going to be made for the Tannoys – and it was. The scale of his piano was not skimmed upon one little bit: it stood at the end of our room full-sized, being pounded by Volodos, in his breathtakingly masterful manner; the Westminsterers threw this into the room at me – awesome (again!). When Volodos attacked the keyboard the power of his playing, as well as his perfect timing and control, were evident. Yet from this, quieter moments fell back to a serene gentleness.

The ability to convey tremendous dynamic contrasts makes the Westminster very communicative in that it brings the skills of a top musician over, as well as the essence of the music being played. The only problem here is that everyday loudspeakers sound dynamically flat and boring by way of contrast.

We had a debate (before measurement) about whether the Westminsterers produced sub-sonics or not when playing tracks like Lady Gaga's 'Bad Romance' with measurable subsonics on the CD.

In the end we decided they

did, but differently. It was there – but with discernible musical content and pattern, rather than a large, amorphous blob of acoustic power. And measurement confirmed this, but it is all a bit different to usual.

Whilst low bass is not overly strong, it is there and under tight control. If you run the speakers at low volume you won't notice the subsonics – but as a check I ran 'Bad Romance' very loud (106dB SPL peaks) when no-one was in the building on a Saturday and – boy – did I get powerful subsonic drive, but it takes the form of a musical thread rather than a slab of low sound, so it isn't easy to recognise from previous experience of reflex loudspeakers, which most are these days.

CONCLUSION

Tannoy's Westminster Royal GRs are so different from all else, it is difficult to compare them.

OK, they do have a 'traditional' sound, warm and are full-bodied in essence.

HOW MUCH POWER DO WESTMINSTERS NEED?

Tannoy quote an amplifier power range of 20W-350W as suitable for the Westminster Royal GRs. But their quoted sensitivity of 99dB/watt is seemingly at odds with this. Just 20 Watts would give 112dB one metre away and shattering levels of 100dB many metres away. I was curious about this.

So I measured what was happening with Lady Gaga's 'Bad Romance', used because of its powerful deep bass that sends up Sound Pressure Level (SPL) readings. With an almost-shattering 100dB being reached 6 metres away from the speakers, a voltmeter set to Max-Hold, connected across the speaker terminals, registered just 4V rms. That's 2 Watts for heaven's sake!

I didn't believe it because the sums said otherwise. What our Bruel&Kjaer SPL meter showed to explain this was very little loss in volume down the 25ft length of the room, just 4dB. And this accords with the peculiar ability we heard of the Westminsterers to drive the whole room as if it had no influence. The speakers sounded almost as loud far away as close; they fill a room in every sense.

How much power do Westminsterers need? Well, 2 Watts – or you'll go deaf. Even I do not believe it – but that's the measured truth. **NK**

But that's ignoring what they do so well – and so uniquely – giving them dynamic scale like no other. I sat in front of 'our' Westminster Royal GRs for long hours – we all did – and everyone was in awe.

In spite of the flaws, the Westminster Royal GR is a breath-taking loudspeaker to hear, especially when the wick is turned up. Then they thunder like no other. If you want sheer scale and a sense of unlimited power, little comes close.

I did often wonder whether this was the loudspeaker for me ... if only my lounge was 2ft longer. And – er – my bank balance a little bigger!

MEASURED PERFORMANCE

With the Tannoy Westminster Royal GR front panel treble adjustment screws set to 0 (i.e. flat) and grilles off, frequency response is as shown in our analysis.

The red trace shows horn mouth output, showing the horn radiates sound forward up to a high 300Hz and this reinforces output from the drive unit (green trace).

This explains the sense of warmth and bass strength in the sound, as well as a little cabinet colour that comes from the horn mouths, listening whilst testing showed.

In line with theory, even a big horn like this doesn't go down far, the Westminster rolling down below 60Hz. However, the roll-down is smooth and even, taking bass down to 40Hz (-6dB). An 18ft room would provide useful modal (i.e. bass) support at 31Hz, suggesting medium-sized rooms suit best.

Forward output from the drive unit is a bit uneven, with a peculiar peak at 1.3kHz also seen in horn output. There was also a distinct step down from this frequency to 4kHz due to the grille cloth, softening the sound with grilles

on. Upper treble rises however, which is why the speaker is not dull sounding, before the big 2in tweeter reaches its 12kHz upper limit and output falls away. A super-tweeter is available from Tannoy to extend treble past 20kHz.

The treble energy adjuster altered high treble, affecting the upper mid-band little, and the treble lift/roll-off had a similar effect.

Big horns are known for being very sensitive and the Westminster Royal GRs were certainly this, producing a massive 97dB Sound Pressure Level from one nominal Watt (2.8V) of input. This is 7dB more than big floor-standers, which in themselves are sensitive at 90dB. Furthermore, they achieve this without drawing current: impedance measured a high 9.5 Ohms overall, and d.c.r. 6 Ohms.

The Westminster is a very light amplifier load, in spite of being sensitive. So even small, low power amplifiers can easily drive these massive loudspeakers.

The Westminsterers reflect the size and complexity of their cabinet, and their massive 15in bass unit; output has some ups and down (resonances) that could

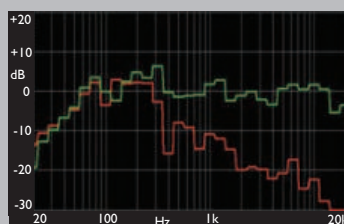
likely be lessened or cured.

But they are still reasonably accurate in balance, if weighted toward a fulsome sound. The grilles are best removed.

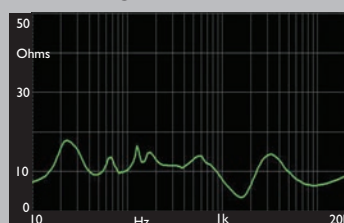
In measurement these speakers are revealed as a trad. horn with some imperfections but also major strengths, including massive sensitivity. **NK**

FREQUENCY RESPONSE

Green - driver output
Red - port output



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the best**

VERDICT

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FOR

- massive soundstage
- enormous dynamic impact
- relaxed

AGAINST

- warm balance
- some box colour
- size

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Back To The Future



The Pharaoh amplifier from America's Rogue Audio mixes valves with the latest in Class D amplification for a distinctive sound, finds Jon Myles.

Blending valves and solid-state devices in an integrated amplifier is hardly a new concept – even if its use is still relatively rare in the mass market.

As I noted in our recent review of Unison Research's Unico Secondo hybrid (see *Hi-Fi World*, September 2015), the idea of combining the tonal richness of tubes with the

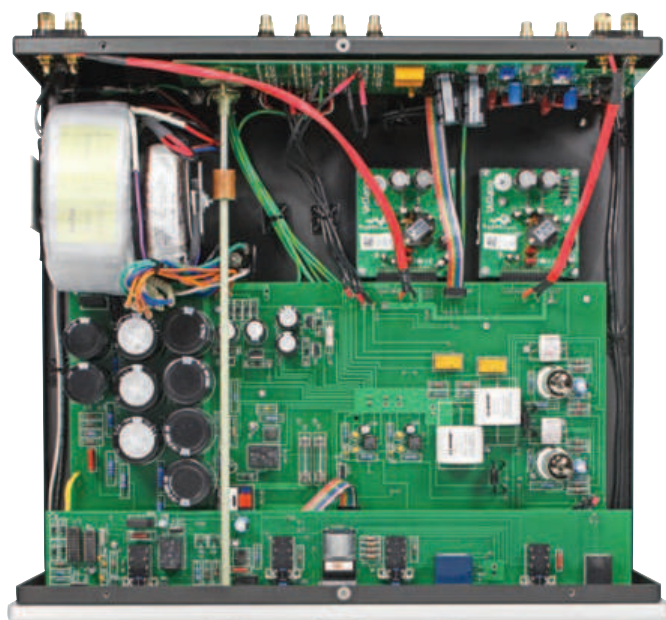
sheer grunt of a transistor output stage makes perfect sense, potentially giving you the best of both worlds.

Rogue Audio's new Pharaoh integrated, however, brings a different twist to the idea by marrying valves to Class D amplification in a topology the company has dubbed TubeD.

There's no getting away from the fact that Class D has something of a chequered reputation in hi-fi circles,

the sound of a number of the first designs likened to the proverbial bag of nails. But the technology has come along leaps and bounds in the past number of years and Rogue Audio's founder and designer believes Class D has many advantages, if implemented correctly.

One of the keys to this is close attention to the power supply. So the Pharaoh eschews the switch-mode



A linear power supply based around a toroidal transformer is combined with Hypex Class D modules to give the Rogue Audio Pharaoh a massive power output of 200 Watts into 8 Ohms, rising to 342 Watts into 4 Ohms.

"that's what makes this amplifier so enjoyable — a combination of detail and a clean, crisp sound with just a hint of warmth"

solution utilised in many other Class D amplifiers, instead employing a high-quality analogue power supply using a large toroidal transformer and extensive regulation. This feeds a pair of Hypex UCD400 MOSFET amplifier modules to deliver a quoted 175 Watts into 8 Ohms (see

Measured Performance for more details), while the pre-amp stage features two 12AU7 (ECC82) tubes.

Rogue Audio say this circuit provides optimal power and control without the edginess, glare or etched sound of some rival Class D-based designs.



A pair of 12AU7 (ECC802) valves are used in the Pharaoh's input stage which in turn is coupled to Hypex UCD400 Class D output modules.

While the company might be a relatively new name in the UK, it has forged a formidable reputation in its native America for well-built valve amplifiers at realistic prices with all components designed and built at its Pennsylvania factory.

A look inside the case shows great attention to detail — with a neat layout and the use of quality components such as Vishay resistors, Mundorf oil-filled coupling caps plus an Alps motorised volume control. And although it may use Class D amplification, the Pharaoh is no lightweight, measuring a large-ish 6.5" x 18.25" x 18" (H/W/D) and tipping the scales at nearly 40lbs.

The front panel has a minimalist black/silver finish with the power switch, rotary input selector, volume control, unity gain switch and balance pot alongside a button to engage the valve-driven headphone amplifier stage. A solid aluminium remote also gives volume and mute control.

Connection options include three unbalanced line-level RCAs, one pair of balanced XLRs, variable and fixed outputs, processor in/out as well as a unity gain input for home theatre set-ups, as well as a MM/MC phono input with adjustable loading. Annoyingly, this latter feature involves removing the case to make your selection via a bank of DIP switches. Why this sort of arrangement cannot be mounted on the outside of the cabinet for both elegance and ease of use is a continual bugbear of mine.

That grumble aside, the Pharaoh is well-built for its £3495 price point with all the controls feeling solid and responsive, while the remote is a cut above the off-the-shelf plastic units you occasionally get from other manufacturers.

SOUND QUALITY

The Pharaoh's combination of valves and Class D modules may be unusual, but it's one that works extremely well.

Connected to a pair of Tannoy Revolution XT6F loudspeakers and playing a selection of tracks via an Oppo BDP-105D universal disc player and a Chord 2Qute DAC, the sound was both clean and extended,



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Connection options include three unbalanced line-level RCAs, one pair of balanced XLRs, variable and fixed outputs, processor in/out as well as a unity gain input for home theatre set-ups as well as a MM/MC phono input with adjustable loading.

with a tonally rich quality.

There's the traditional Class D attributes of plentiful detail to the top end but the midband has a degree of warmth that adds a sense of body to the music.

Valery Gergiev and the London Symphony Orchestra's rendition of Brahms' 'Symphony No 3' (24/96) had plenty of air and sweetness while the sound of bow on string from the violins was keenly etched without turning glassy or harsh.

If anything the presentation is slightly forward which brings a sense

was never less than well-defined and tuneful.

The same quality imbues the phono section. Heaven 17's 'We Don't Need This) Fascist Groove Thang' via the MM setting had a driving dynamic that suited this

slice of 80s electronica well. As befits its era, the 12" single has a prominent zing to its production but the Pharaoh reined in its worst elements to stay just the right side of harshness without losing detail.

Indeed, that's what makes this amplifier so enjoyable – a combination of detail and a clean, crisp sound with just a hint of warmth to avoid sounding too clinical. Yes, it's an unusual design – but one that works extremely well.

CONCLUSION

Rogue Audio's Pharaoh integrated marries the power and efficiency of Class D amplification to the harmonic richness of valves. Add in great build quality and a good phono stage as well and it's a tempting proposition.

MEASURED PERFORMANCE

The Rogue Audio Pharaoh produced a massive 200 Watts into 8 Ohms, rising to 342 Watts into 4 Ohms, through its Hypex Class D modules. This will drive all loudspeakers to very high volume, even in a large room.

Hypex modules give very low distortion right across the audio band and those in the Pharaoh were no exception. Distortion at 1kHz measured 0.02% and at 10kHz 0.03%, both at 1 Watt. At full power (-1dB) these figures rose little, to 0.07% and 0.1%, into a low 4 Ohm load – an excellent result. The sound will be clean and lacking harshness.

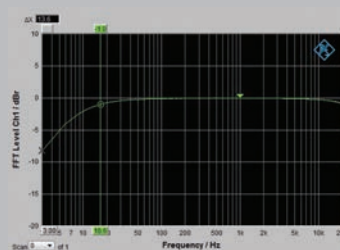
Output impedance was low also, resulting in a high damping factor figure of 55, so the amplifier will have relatively tight bass.

Frequency response measured 16Hz – 29kHz (-1dB) as shown in our analysis, covering the audio band but no more, into 8 Ohm and 4 Ohm loads, so unlike many Class Ds the Hypex modules change response little with load.

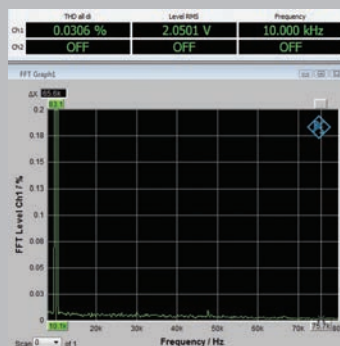
Phono stage equalisation was accurate, resulting in flat frequency response, a warp filter curtailing output below 40Hz. Input sensitivity was seemingly low at 8mV for MM and 0.8mV for MC, but the amplifier has so much voltage gain, swinging 40V out, that in use it won't seem insensitive. Noise on MC wasn't especially low at 0.26µV e.i.n., around 6dB noisier than possible, so low output MCs are not an ideal match.

The Pharaoh is massively powerful yet very clean in its output. Combining high power Class D Hypex modules with a valve stage to give valve sound should work well. NK

FREQUENCY RESPONSE



DISTORTION



The Pharaoh's MM/MC selection is handled by a sliding switch inside the cabinet with a set of DIP switches for select-input gain.

of speed and vibrancy – but not in an unnatural or uncomfortable way.

Switching to some more up-tempo sounds in the shape of The Pixies' 'Wave Of Mutilation' CD and it's clear the Pharaoh can exert an iron grip on the loudspeakers. The fearsome descending bass intro of 'Debaser' had palpable depth and was driven along with real speed and power. It perhaps lacks the meaty, bouncy quality of something like my resident Naim Supernait 2 – having a slightly drier quality instead – but

ROGUE AUDIO PHARAOH £3495



OUTSTANDING - amongst the best.

VERDICT

A fine-sounding amplifier that will appeal to many with its combination of detail, power and tonality.

FOR

- powerful
- detailed sound
- rich midband
- phono stage

AGAINST

- fiddly MM/MC settings

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Great things can come in diminutive (albeit pricey) packages, reckons Martin Pipe after hearing this amp/speaker package from Benchmark.

Think small!

A few months ago we brought you a review of Benchmark Media's £1700 DAC2 HGC – a compact, exquisitely-engineered and fine-sounding unit that combines the functions of DAC, preamplifier and headphone amplifier. This American manufacturer with a pro-audio heritage has now launched a pair of bookshelf speakers and a diminutive yet potent power amplifier. In short, the DAC2 HGC now has a system to go with it. Just add

sources...

Let's start with the speakers. The SMS1 looks fantastic, with rounded edges (to minimise cabinet diffraction effects), substantial metal grilles and distinctive wooden side-panels. It is built around a 25mm silk-dome tweeter and 6.5in. woofer with long-excursion copolymer cone, the crossover frequency being 3kHz.

Biwiring and bi-amping are supported, although you have to use pro-type Neutrik NL4 'SpeakOn' plugs. However, a delightfully 'old-

school' toggle switch enables the input to be derived from a pair of binding-post terminals.

This speaker is unusual by modern standards insofar as it's a sealed-box 'acoustic-suspension' rather than a bass-reflex design – there's not a port in sight! Benchmark (perhaps unfairly) associates ported speakers with 'bloated bass', and its designers are prepared to trade the lower efficiency of acoustic-suspension speakers for the improved low-end

accuracy the firm claims they deliver. Benchmark's published spec claims a sensitivity of '88dB'.

However, this number is meaningless without other data (measurement parameters) to qualify it. A recently-reviewed ported speaker – Opera's Mezza – was measured by Noel Keywood at 87dB (1W/1m); using an identical testing procedure, Spondor's D1 – like the SMS1, an acoustic-suspension design – delivered a sensitivity of 83dB. But factors like crossover design and drive units also play a critical role in determining speaker sensitivity.

Whatever. Sensitivity is really only an issue if you're driving speakers with low-powered amplifiers like the single-ended triode variety. These days, though, high quality and high power need not be mutually-exclusive. And to illustrate this fact we have Benchmark's own contribution – the AHB2 which, with its heatsinked sides, looks like one of the power amps that came with upmarket Japanese mini systems of the late '70s and early '80s. In keeping with such heritage, it even boasts a fair quantity of front-panel indicators!

And we mean 'high power'; the 6kg AHB2 may be small but it's capable of simultaneously-delivering 100W to each channel with THD levels in the parts-per-million league. Yet for all this, it runs remarkably cool – even over extended listening periods. This is down to, amongst other things, the use of a switch-mode power supply and those side-fins.

The amplification is itself Class AB, but with some Class-H (power-supply tracking) and 'achromatic' refinements developed and patented by the THX organisation better-known for its contributions to cinema sound. They cover distortion-cancellation, noise-minimisation and efficiency improvements.

Although two pairs of binding posts are available, the AHB2 is peppered with SpeakOn socketry. There are three such connectors – the four-way (NL4) variant. One contains the right channel, another contains a mono output for a selectable bridged mode (200W) and the third offers the left and right channels on its four pins. This enables a single AHB2 to neatly bi-amp a speaker; note that here, your left and right inputs (which, incidentally, are on balanced XLR connectors – with switched sensitivity) would have to be fed from the LF and HF outputs of



Considering its small size, the AHB2 squeezes a considerable number of connectors and switches onto its rear panel.

an electronic crossover. Care needs to be taken during installation...

SOUND QUALITY

Performing source duties for my listening tests was a Benchmark DAC2 HGC, fed coaxially by a

AHB2 to the SMS1s, and these were used. The speakers were operated in 'normal' mode, and set up as per the manufacturer's recommendations – away from walls, about 6 feet from the listening position, 'toed in' and with tweeters at ear height.

"I was also impressed with the sense of space the system created; it felt uncannily as if I was in the church"

Roksan K3 CD player (i.e. the Benchmark was performing digital-to-analogue conversion duties). As this was 'Proms season', a Rotel RT930AX FM/AM tuner was connected to one of the unit's analogue inputs. The DAC2 HGC's output drove the AHB2 via standard XLR balanced cables.

Benchmark importer SCV Distribution supplied high-quality SpeakOn cables for connecting the

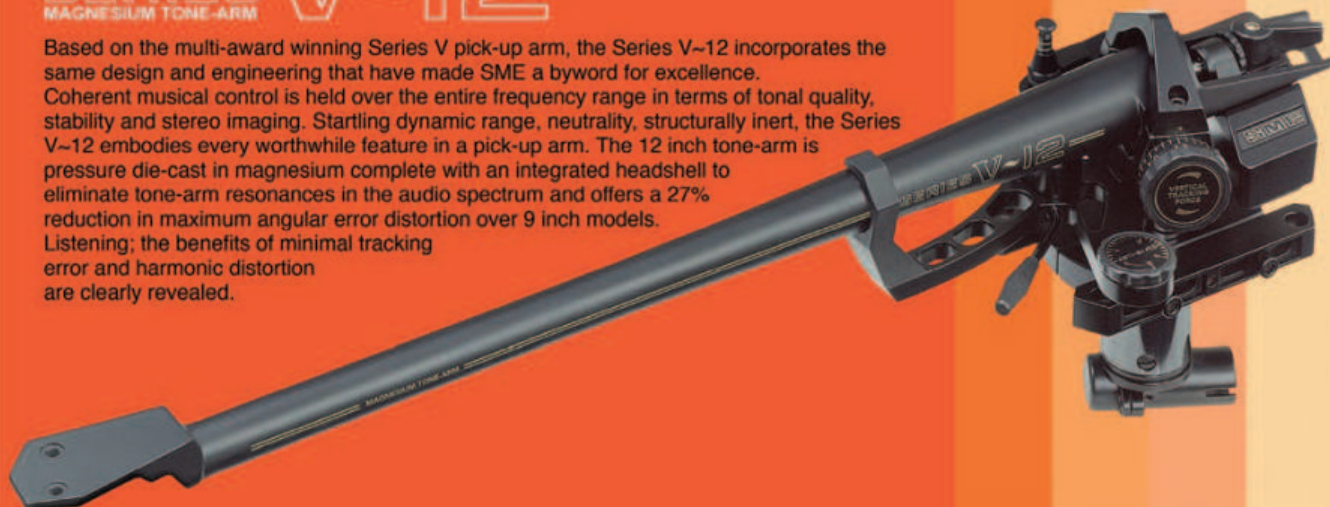
I was admittedly quite cruel with my initial choice of listening material – but we shouldn't forget that in all, the cost of this equipment is around £10k. And for that sort of money, we can expect a high standard of musical reproduction. So first in was a U-Sound CD of Vladimir Homyakov playing Bach organ works on the Eule organ (alas since removed) at St. Alexander Church in the Russian city of Chelyabinsk. Yes, we're going to try



The SMS1 can be 'bi-amped', but only if you're using the Neutrik terminal – a rare sight on speakers sold to consumers. If you're using two AHB amplifiers, bi-amping of a stereo pair is possible with single cable runs – note that 'normal' use is supported too. Binding posts are included for compatibility with conventional gear; the desired input is selected with a toggle switch.

SERIES V-12 MAGNESIUM TONE-ARM

Based on the multi-award winning Series V pick-up arm, the Series V-12 incorporates the same design and engineering that have made SME a byword for excellence. Coherent musical control is held over the entire frequency range in terms of tonal quality, stability and stereo imaging. Startling dynamic range, neutrality, structurally inert, the Series V-12 embodies every worthwhile feature in a pick-up arm. The 12 inch tone-arm is pressure die-cast in magnesium complete with an integrated headshell to eliminate tone-arm resonances in the audio spectrum and offers a 27% reduction in maximum angular error distortion over 9 inch models. Listening; the benefits of minimal tracking error and harmonic distortion are clearly revealed.



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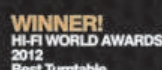
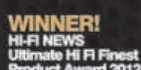
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Fitting a pair of 100W amplifiers – and power supply – into a box 11" x 4" x 9" – must have proved an engineering challenge, as this busy but neat layout suggests. The switch-mode power supply (which accounts for most of the larger components you can see) clearly helped.

playing organ music on a modestly-sized pair of bookshelf speakers!

And my jaw dropped. Admittedly, Benchmark hasn't circumvented the laws of physics – reproducing the low notes of a large pipe organ demands large speakers. But the SMS1 put up a good fight, with no signs of fatigue. It may not go as deep as, say, a large floor-standing transmission-line speaker. But unexpected depth there is, and natural it sounds too. I was also impressed with the sense of space the system created; it felt uncannily as if I was in the church.

There's also an enormous amount of resolving power on tap, drawing the listener into the previously-hidden details of rather dense and murky recordings like Radiohead's 'OK Computer'. You could even make out what Thom Yorke is singing in 'Electioneering', a track that sounds horribly confused on lesser systems. The caveat here is that the SMS1s' grilles are removed; doing so benefits the higher end in particular. The fulsome bass guitar of 'Subterranean Homesick Alien' is done justice, its lead guitar and drums being presented with filigree detail too.

A selection of favourite vintage funk and soul tracks – among them such classics as The Jones' 'Girls' 'Nights Over Egypt', Earth Wind and Fire's 'Let's Groove' and Total Contrast's 'Takes A Little Time...' – demonstrated a superb sense of timing and rhythm. And once again, the low-end (the 'Let's Groove' bassline for example) fares well.

It's tight, tuneful and well-scaled. I was also impressed with some of the detail that could be extracted from the latter. Yet no musicality is

sacrificed for this analytical prowess.

Switching to radio, I was pleased to find that voices – male and female – were given a natural presence, the system striking a sensible balance between warmth and dryness. The system proved just how good the BBC's Radio 3 FM service can sound. With Prom concerts, the soundstage was such that instrumental groups and soloists were definable. That, plus the detailing, made these concerts enjoyable to the extent it was difficult to turn off. Which was just as well, as the combo demonstrated – through subsequent Radio 3 programmes like Late Junction – its ability to handle a range of different musical styles.

CONCLUSION

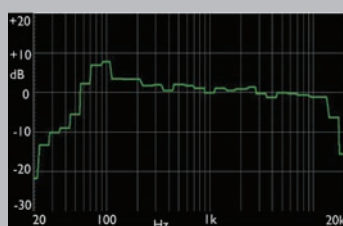
Considering that the AHB2 and SMS1 are Benchmark's first forays into amplification and speakers respectively, it has managed an impressive feat. If you want a large-scale yet musical sound but don't have the space for big boxes, they're well worth checking out.

MEASURED PERFORMANCE

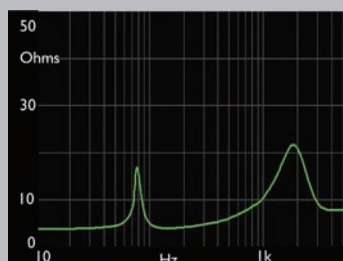
The AHB2 power amplifier produced 100 Watts into 8 Ohms and double, or 200 Watts, into 4 Ohms, suggesting it has a regulated switch-mode power supply. Distortion levels were low across the audio band, into 8 and 4 Ohm loads, so the AHB2 is linear and will not sound coarse in its treble.

Our frequency response analysis of the SMS1 sealed-box (infinite baffle) loudspeaker shows it is a well integrated design where the two drive units match well and give strong upper midrange output, which will sustain the delivery of detail. Treble rises a little on-axis but

SMS1 FREQUENCY RESPONSE



SMS1 IMPEDANCE



off-axis response shown here is flat to 16kHz, meaning there will be no treble sting nor any undue brightness in the sound. The SMS1 will sound tonally neutral across midrange and treble. However, although Benchmark say the lack of a port eliminates port resonance, in fact it is port resonance that is used to damp drive unit resonance in what is termed an anti-resonant system. Lacking this damping mechanism, the SMS1 bass unit resonates strongly at 80Hz and this acts to lift bass progressively below 300Hz, adding body and weight to the sound. With +8dB lift at 80Hz, bass from the SMS1 will be conspicuously heavier than that of other loudspeakers, and it also looks "one note", as the resonant peak is sharp.

Sensitivity was reasonably high, measuring 86dB from one nominal Watt (2.8V) of input.

The SMS1 loudspeaker will sound smooth and detailed but bass heavy. The AHB2 power amplifier has plenty of muscle and can drive its relatively low impedance 4 Ohm bass unit with ease.

NK

Power	100 Watts
Frequency response	3Hz-60kHz
Separation	96dB
Noise	-110dB
Distortion	0.01%
Sensitivity	380mV

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AHB2 AMPLIFIER,
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BENCHMARK
SMS1 SPEAKERS,
£2,400**



OUTSTANDING - amongst the best.

VERDICT

A fine amp and speakers. We look forward to more from Benchmark.

FOR

- fantastic detail, dynamics and imaging
- unfatiguing; easy to listen to
- surprising low-end weight for the size

AGAINST

- grilles may look attractive but they're best removed
- lacks the absolute bass extension of similarly-priced larger speakers
- non-standard connectivity

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Junior class

Astell&Kern launch a budget hi-res portable, the Junior. Noel Keywood listens in.

Astell&Kern (Korea) led the hi-res portable player revolution with the excellent AK100 I reviewed in our March 2013 issue, price £569 at the time. Since then their prices and specifications have spiralled upward; an AK100 II now costs £800. With effective competition coming from FiiO (China) in particular, A&K needed a less expensive model to fight back and here it is, the

Junior, price £400.

That still isn't cheap. I have just reviewed the excellent FiiO X3 – price £150 – and it was superb, with no weaknesses, so the Junior needs to make a strong case. And to get to the point, it failed to, hi-res having a dynamic range substantially worse than CD – oh dear! But the Junior is nice to use and makes a good impression – and with the name Astell&Kern garners good reviews all the same.

The Junior is small and light and it has a touch screen, unlike its rivals. This has always been a distinguishing feature of Astell&Kern players, the upmarket brand name of products from iRiver, founded by ex-Samsung executives. The case

– and on the bottom and microUSB socket for charging and file transfer from a computer, plus USB DAC functionality.

Press the power button at top and it fires up in a fast 12 seconds, presenting a clear screen, with six touch zones (tiles) comprising the normal categorisation of Songs, Artists, Albums, Genres, Playlists and an additional Folders that takes you to those loaded, in our player sample music files that came pre-loaded, a Music folder that we loaded and User Manuals.

At top right on the screen is a gearwheel icon that brings up various options, including Bluetooth connection (to the hi-fi), USB DAC and Line Out. 'USB DAC' means

"the Junior was a sweet-sounder, and this carried through to simple vocal tracks"

feels solidly hewn – it's aluminium – giving the same handling impression as an iPhone. Measuring 53mm wide, 118mm high and just 9mm thick the player will fit a shirt pocket easily, its low measured weight of 99gms posing no threat to the stitching.

Astell&Kern keep the Junior simple. It has a single 3.5mm stereo headphone jack at top, but no optical digital output inside, unlike other A&K players. On top also sits a small power button.

On the right side lies a circular mechanical volume control and microSD card slot (64GB max), on left side are three transport buttons – forward, back, play/pause

using the player as an external DAC/headphone amp., when connected to a computer; the Junior has no digital output that allows it to play into an external DAC. And Line Out means fixed output from the headphone socket, bypassing the volume control, with 2V available turning the Junior into a 'CD player' in effect, albeit one that plays hi-res digital files.

What files can it play? Well, most files: WAV, FLAC, WMA, MP3, OGG, APE(Normal, High, Fast), AAC, ALAC, AIFF, DFF, DSF, all up to 24/192 spec, except DFF/DSF which are DSD (one bit) file formats. Missing from the list is double rate DSD, or DSD128 – not a major omission. As long as





A small volume control wheel and microSD card slot adorn the right side.

On the base lies a microUSB socket for charging and file upload, as well as connection as a DAC.

WAV, FLAC and Apple formats are there (ALAC and AIFF) most people are served.

A Lithium Ion 3.7V, 1450 mAh is fitted and gives around 11 hours playback time. There's 64GB memory on-board, 64GB in a microSD card and OTG (On The Go) storage can be used too.

SOUND QUALITY

My initial impression of the Junior, playing a range of classic and Rock tracks through Oppo PM-1 (planar magnetic) headphones was one of a delightfully mild, easy going sound – silky on the ear. This is nice I thought, if at the opposite end of the spectrum to Lotoo's PAW Gold I reviewed in our October 2015 issue, that was a beast – albeit an exciting one!

But the Junior didn't much grab my attention. So I changed to Philips Fidelio X1 headphones with velour pads in place, because they have more top end sparkle and slightly bouncier bass. This made little difference.

The issue was best illustrated when playing a solid Rock demo track like Fleetwood Mac's Go Your Own Way (24/96). On my Astell&Kern AK I20 this ripped along, underpinned by the impactful drumming of Mick Fleetwood. Playing this same track on the Junior was disappointing: it lacked the punch and dynamism, even the sharply delineated and wide sound stage was smudged over, becoming a vague representation; the track had lost its verve.

The situation was less clear with classical music. Here the Junior's svelte mid-band well conveyed the Allegri String Quartet – and reviewer Rafael Todes – playing Beethoven's Quartet in C minor, Opus 18, No4 (24/192).

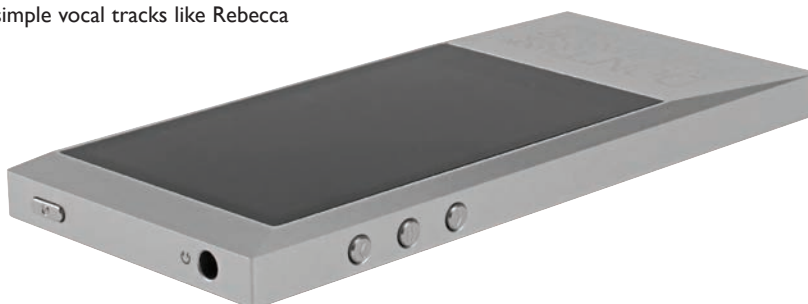
This wonderful recording played beautifully through the Junior with X1s connected; I'll swear I could hear rosin in Rafael's strings (he'll likely tell me there wasn't any!). With material like this the Junior was a sweet-sounder; and this carried through to simple vocal tracks like Rebecca

Pidgeon singing Spanish Harlem (24/176.4kHz) that were gloriously smooth and insightful across the midband, if again a tad soft or 'gentle' all round.

CONCLUSION

This is a small, light and eminently pocketable player – one for the handbag or top pocket methinks. It offers a mild, easy going sound with good midband insight but weak bass drive – entertaining but not viscerally exciting. I liked the small touch screen, clear text and graphics but I wince at the price; FiiO offer more for less these days.

The top carries an on/off button and 3.5mm headphone jack socket that carries analogue audio only, not optical digital like more expensive Astell&Kern players. There are transport buttons too.



MEASURED PERFORMANCE

The Astell&Kern Junior produced 2V out at its headphone socket, enough to drive even insensitive headphones very loud. This is a high output for a small player.

Distortion at full level (0dB) measured a low 0.008%. However, low level resolution was poor, a -60dB signal

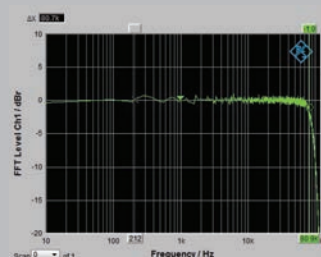
suffering from noise and measuring 2% Lch and 1.5% Rch distortion with 24bit digital, where around 0.1% is the norm from a budget product.

As a direct result EIAJ Dynamic Range measured a poor 82dB from 24bit, way below the 110dB or so expected, and below CD's 102dB, so the Junior falls well short in this important measurement. Switching the headphone output to Line mode, eliminating the volume control, did not affect this result.

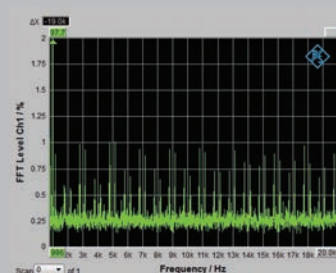
Frequency response with 192kHz sample rate was extended, reaching a very high 81kHz, so in this respect the Junior complements high-res.

Whilst the Junior measures well in many areas, it critically falls short in dynamic range and sound quality will suffer as a result. **NK**

FREQUENCY RESPONSE



DISTORTION



Frequency response (-1dB)	
CD	10Hz-81kHz
Distortion	24bit
0dB	0.008%
-60dB	1.5%
Separation (1kHz)	89dB
Noise (IEC A)	-111dB
Dynamic range	82dB
Output	2V

ASTELL&KERN JUNIOR £400



EXCELLENT - extremely capable

VERDICT

Pleasantly mild sound with insight, but weak bottom end drive and soft stereo imaging – and expensive.

FOR

- small and light
- easy to operate
- looks smart

AGAINST

- weak sound
- soft imaging
- no digital output

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- Hi-Fi News | October 2015



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- Hi-Fi News | September 2015



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Sopra n°1

NEW

Beyond this attractive first impression, what's astonishing texture and smoothness of its sound. It provides a solid, "f sound with full and articulated bass. Precision is by no means artificial, nor is it limited to the treble. The overall coherence and harmonic richness of the Sopra n°1 is remarkable, heightening ones understanding of the music being played.

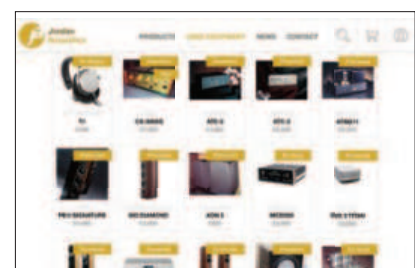
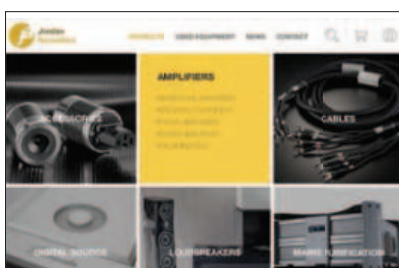


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Pure XTZ

A distinctive shape and a distinctive sound make the new M2 loudspeakers from Scandinavia a winning combination, says Jon Myles.

Swedish audio company XTZ has forged an enviable reputation for producing well-engineered, great sounding components at real world prices since its inception just over 11 years ago.

Founder Ollie Eliasson has almost 30 years experience in the business and an unbridled passion for loudspeaker and electronics design as well as providing value-for-money products.

The policy has proved a big success with XTZ expanding its range over the years to include headphones and earphones, amplifiers, CD players and measuring equipment as well as its core range of loudspeakers.

The latest model to join the

stable is the new XTZ Master Series M2 standmount – which in typically uncompromising fashion the company describes as “a truly unique product in the audio world: a compact loudspeaker designed under all aspects as a real high-end speaker but at a price point that is rare in this industry. Master M2 is built without compromise that comes close to the perfect high grade 2-way speaker within its dimensions”.

That’s quite a claim for a ‘speaker costing a relatively modest £1400. But unbox the M2s and you immediately realise a significant amount of engineering has gone into their construction.

The cabinet, for a start, is a teardrop shape and constructed from a new composite material consisting

of epoxy, polyurethane, potassium carbonate and organic gas bubbles which is said to be 40 per cent denser than MDF and so better able to control resonances. Added to this is significant internal bracing which accounts for each ‘speaker weighing more than 9kg each from what is a relatively compact 231mm x 424mm x 374mm (H/W/D) cabinet.

The main mid/bass driver is a 165mm polypropylene unit developed by Norwegian specialist manufacturer SEAS to XTZ’s own specifications, while the tweeter is larger than average at 30mm and is deep set in its own waveguide to improve efficiency and provide better high-frequency dispersion.

Round the back are two pairs of gold-plated terminals to facilitate

bi-wiring if required, and a reflex port for which two bungs are supplied to provide different room tuning – a full one to give sealed-box response and a semi-open variety for those wanting more bass (more of which later).

Fit and finish is extremely good with the high-gloss black finish and unusual shape making the M2s stand out from the run-of-the-mill box design of many rivals.

SOUND QUALITY

As befits the attention to detail put into the design of the M2, it requires a good degree of care from the listener to get it sounding at its best.

That's because it is essentially highly revealing and so positioning, the use of the bungs and partnering electronics are all vital – more so than in many other loudspeakers around this price.

Setting them up initially with the full bung in place and situated close to a rear wall they sounded fast and detailed but rather dry in the low-end. Switching to the semi-open sleeve and bass response became decidedly fuller and more rounded – which was how I used them for the bulk of the listening.

Similarly, a Class A Sugden FBA-800 power amplifier – while clean and clear as always – sounded a little short of the requisite drive to really get the M2s to sing. Instead I opted for the 100-plus Watts of the excellent Creek Evolution 100A integrated which really brought things alive.

Now I could hear what the XTZs are capable of – which is an exceptionally smooth, sophisticated sound which majors on detail and insight as opposed to artificially extended highs or lows.

On Messiaen's 'Quartet For The End Of Time' the piano, clarinet, cello and violin are placed with pinpoint accuracy in the soundstage. There's air and extension to the tweeter although not in the sense of sounding bright or forced. Instead instruments have a sense of life and timbre.

The open nature of the M2s also mean they reveal details in tracks that some other loudspeakers gloss over. Listening to Saint Etienne's shimmering 'Milk Bottle Symphony' the sound of tinkling glass and footsteps could have been there in the room with me.

That same quality means the M2s handle more up-tempo performances with aplomb, having a subjectively

'fast' sound with no sense of bloat or unnecessary bass drag. The Killers' 'Human' was driven along at great pace, the bass firm and taut but never overdone.

All these qualities, however, mean the M2s don't flatter poor recordings. Playing over-compressed pop or rock I soon knew about it – but that's a trade-off to the overall accuracy of the design.

What the XTZ M2s will do, however, is shine a clear light onto your recordings and even the quality of components used with them bears comparison with loudspeakers costing many hundreds of pounds more.

CONCLUSION

If you want an accurate, revealing loudspeaker that will tell you exactly what your system is capable of, the XTZ Master Series M2s could be exactly what you are looking for. Partner them with the right amplifier and take time with positioning and tuning and they really do belie their price tag.



The rear of the Master Series M2 includes a pair of 'speaker terminals, plus a tuneable reflex port with XTZ supplying a full and semi-open bung to tailor bass response to the room.

MEASURED PERFORMANCE

Frequency response of the XTZ M2 shown in our analysis runs smoothly and evenly across the audio band. The drive units are well integrated, with no trough at crossover and this result was held at a range of measuring-microphone positions vertically and laterally, helped by the small horn in front of the tweeter. So the M2 can be pointed at listeners or straight down the room with little difference in its sound balance. And it is fundamentally accurate in this balance, so will sound

smooth and a tad less bright than many.

Sensitivity measured 84.5dB from 1 Watt input (2.84) and overall impedance measured 8.8 Ohms, quite a high value, explaining the low-ish voltage sensitivity figure. The bass unit has a high d.c.r. of 7 Ohms, where 4 Ohms is common nowadays, expelling the low sensitivity; the speaker draws less current than most, but needs amplifiers with some power, 60 Watts or more being suitable.

Our impedance trace shows the open port as green, the annular bung as yellow and full bung as brown. When measuring frequency response with the annular bung, a peak at 40Hz appeared in the response trace and clearly this bung offers a good compromise with a little more bass heft. However, with no bung the speaker was bit more even in response, whilst the full bung did, as is common, negate port action, turning the cabinet into an Infinite Baffle the brown trace shows. This gave a damped frequency response where bass rolled off steadily, suiting near-wall placement. Port output was high so it contributes substantially to bass.

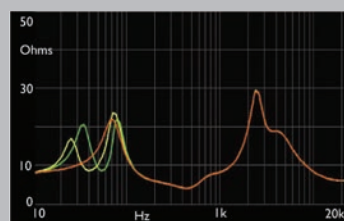
The M2 measured well. It is tonally accurate and will sound smooth, yet detailed. It does need to be used with a reasonably powerful amplifier however. The two different bungs supplied offer useful fine tuning options. **NK**

FREQUENCY RESPONSE

Green - driver output
Red - port output



IMPEDANCE



XTZ MASTER SERIES M2 £1400



OUTSTANDING - amongst the best.

VALUE - keenly priced

VERDICT

A revealing, accurate loudspeaker that majors on detail and insight but is never less than enjoyable.

FOR

- accurate
- insightful
- bass tuning possibilities
- build

AGAINST

- doesn't flatter poor recordings

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Here's your chance to win the Castle Avon 5 loudspeakers we reviewed last month. Read the review excerpt below and answer the questions.

"What we are looking for from the Avon 5 is better damped bass that "plays a bass tune" more evenly than most other (reflex) loudspeakers, and goes lower down the frequency scale too – meaning you get sub-sonics. Sounds good perhaps, but sub-sonic output needs to be carefully judged if a room is not to boom as a result of having too much low bass pumped into it. A transmission line does this better

because it is not, in itself, a resonant (bouncy)

system, whereas a reflex is. So you stand a better chance of getting firm, even bass from a transmission line in a real-life room.

Ribbon tweeters shame domes, but they are expensive and difficult to integrate with cone drivers. That's why you see a small 90mm midrange unit just below the ribbon tweeter on the Avon 5, so as to match it in without problems in the crossover region.

And either side of the tweeter and midrange unit, at top and bottom of the array, there are two modestly sized 130mm bass units. Each one is loaded by the rear quarter-wave transmission line. And our measurements clearly showed this

line works properly, doing what it is expected to do: go low and not be resonant.

The cabinet stands 111cms high (1.1m) on its plinth, 36cms deep and 21cms wide, although the plinth adds 1cm all round to this and the rear gold plated bi-wire terminals add some too. Weight is a reasonable 26kgs, which is fairly easily liftable".

For a chance to win this great prize, just answer the four easy questions at right. Send your entries on a postcard only, by November 10th 2015 to:

**November 2015 Competition,
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Studio 204,
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QUESTIONS

[1] What does Avon bass do?

- [a] the Tango
- [b] a Fandango
- [c] plays a bass tune
- [d] wreck furniture

[2] Too much low bass makes a room -

- [a] boom
- [b] rejoice
- [c] squeak
- [d] dissolve

[3] A transmission line is not -

- [a] flouncy
- [b] bouncy
- [c] rubbery
- [d] squidgy

[4] Ribbons do what to domes -

- [a] compete with them
- [b] match them
- [c] sneer at them
- [d] shame them

entries will be accepted on a postcard only

AUGUST 2015 WINNER: BLACK RHODIUM SAMBA VS-1 SPEAKER CABLES
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Visit our website at www.hi-fiworld.co.uk or send your emails to letters@hi-fiworld.co.uk. Letter of the month wins a pair of KEF Q100 loudspeakers.

Answers by: **NK** - Noel Keywood; **JM** - Jon Myles; **PR** - Paul Rigby; **MP** - Martin Pipe; **RT** - Rafael Todes.

LETTER OF THE MONTH PRIZE



KEF Q100 LOUDSPEAKERS

For more advice see Letters from earlier issues at www.hi-fiworld.co.uk/letters

A pair of KEF Q100 loudspeakers are on their way to GRAHAM RALPH, Letter of the Month winner in our October 2015 issue.

Letter of the Month

PI MAN

I was interested to read your piece in the October 2015 issue of Hi-Fi World concerning having a Raspberry Pi to review. I've been using a Raspberry Pi as my main network audio media player for the last few months and I love it. I started with a Pi B+ together with a IQAudio Pi-DAC. This was a good introduction to me of the capabilities of the Pi/DAC combination.

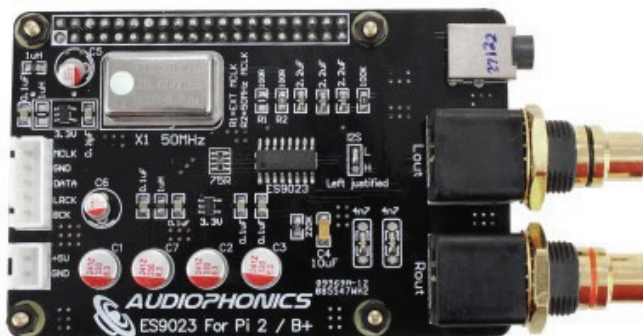
The key component in getting everything to work together is a dedicated OS image. There are a number available. I had most early success with Volumio (<https://volumio.org/>). This is a version of the Raspberry Pi Linux OS, with drivers and audio streaming app set up. You download the image file and then copy it onto a microSD card. Instructions on how to do this can be found on the Raspberry Pi site concerning installing images.

With the image installed, you can start the Pi (by simply powering it up), and then from your computer, you browse to <http://volumio.local/> where you'll be presented with the web interface for the Pi. You then need to go to settings (Menu -> System -> I2S DAC) and change the setting to match your DAC.

Next go to the Library page and set up a NAS mount point. This needs to be set to connect to a network resource that hosts the music files on your network. NAS boxes work fine



Rob Nicols housed his credit card sized Raspberry Pi computer in a small wooden box.



The Audiophonics ESS DAC board for the Raspberry Pi which includes the highly-regarded Sabre ES9023 DAC chip set.

- but it can be a bit of a fag working out the correct path to the music.

Once all that is done, Volumio will index your music and you can start playing. The music is controlled from your computer browser (there are also phone apps if you prefer).

The quality of the playback surprised me. From what is a unit that you can put together for less than £100 the sound is amazing.

Since starting down this route, I've now moved on to an Audiophonics I-Sabre DAC ES9023 TCXO which has a Sabre ES9023 DAC chip set. See [I've also invested in a MCRU dedicated power supply for the Pi: See <http://www.mains-cables-r-us.co.uk>. This adds a little more clarity to the presentation.](http://www.audiophonics.fr/The sound quality from the Audiophonics Sabre DAC/Pi combo is excellent – better than the Marantz NA7004/Peachtree DAC-IT that it has replaced. Excellent detail, and sound stage. A wonderfully natural sound.</p>
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I've also tried some alternative OS options. I think Runeaudio if anything, is better than Volumio, though not quite so easy to set up (for me).

Altogether, my adventures with the Raspberry Pi / DAC combo has been very rewarding. I'd thoroughly recommend other audiophiles giving it a try.

All the best,

Rob Nichols

That was a nicely timed letter Rob, considering our feature on the Raspberry Pi in this issue! Thanks for your experiences – and I hope others find them interesting.

There does seem to be a split here though. I notice from the forums that Raspberry Pi enthusiasts love the whole shebang and I can certainly see why – but is it ever time consuming. You have to love computers and the vagaries of their software before being absorbed by this subject. There were times when I just wanted to die! But Raspberry Pi is awesome in its own way – no wonder it is a global success story.

That Audiophonics of France make a DAC board with an ESS Sabre DAC, a 9023, is also interesting. It doubtless gives very good results. Whilst the Cirrus Logic board we used is tailor made for the Pi and works very, very well, it is still based on a mobile phone chip and hampered by inadequate documentation.

We found a good power supply

was essential, for measurable reasons, so your observations on this tie in with ours. **NK**

X FACTOR

I wrote a while back regarding computer audio but still didn't feel able to take the leap. Then I saw your review of the X40 and thought that it was perfect for me. I could store all of my CDs on hard drive yet keep the physical media in the loft, listen to internet radio and download music from the internet (this last bit I think you need a computer for). Even better, I could archive old tapes and stuff with the analogue inputs and I wasn't paying for an amplifier I didn't need. Something of a dream product for me and my ilk (old buggers from the valve and vinyl era) so I was a touch confused when a reader wrote in to say that his X40 wasn't quite as lively as his old CD player and you more or less said swap it for a DAC and stuff. I'm guessing he bought the X40 based on your review.

I haven't committed to it yet, although it was positively reviewed in Hi-Fi Choice recently. Reviews on Richer Sounds website weren't so positive, so I've left it for now. Are there any other machines that do what the X40 does?

OK, onto the other thing that still confuses me a bit. If I want a hi-res download I assume I wheel out the PC and download it to the PC or memory stick then send it by wire to the X40? Why can't the stores (particularly HMV) offer downloads for sale take your memory stick in, (or they supply the memory stick) and then they sell and load hi-res files of your favourite album on it (or tracks). They could probably negotiate exclusives at a rate acceptable to artists. Imagine if they got the Beatles or the Pink Floyd catalogue it would revive their fortunes in one hit!

Furthermore, just a plea from me and I know there are plenty like me

could we have a quick idiot guide in a box for streamers/DACs and so on along the lines of you'll need a computer to play the radio, files etc, a tablet to get the best out of the remote, it has an amplifier etc. We see words like Deezer and Twonky and they just sound ridiculous to some of us!

Sorry for the grumpy tone of the letter. I am very positive about the benefits of computer audio and with the new solid state memories coming along we could be heading for truly superb sound quality and reliable source material.

Geoff Egginton

Hi Geoff. The NovaFidelity X40 is an excellent machine for the money and would allow you to do all you require in one very handy, easy-to-use package. In terms of its CD replay it is very smooth and detailed - due in no small part to the use of the excellent ESS Sabre ES9018 DAC.

How it compares to standalone CD players in terms of presentation is always going to be, to a large degree, a matter of personal taste. I've heard some silver disc spinners costing around £1000 that have more punch and overall drive about them - but also a good few others that are nowhere near as naturally musical as the X40. As ever, your own ears and taste will be the deciding factors and I'd encourage you to try to have a listen to the X40 and make your own mind up.

At present, I know of no other product that offers the NovaFidelity's range of features and sound quality in a single unit. One alternative, however, would be to look at something like Oppo's BDP-105D player - which as well as offering high-resolution streaming will also play CD, SACD and Blu-ray discs and is available for around £1000. Add a



The NovaFidelity X40 offers music storage on hard drive, silver disc replay and streaming, all in one affordable package – and it sounds superb. This will suit Geoff Egginton, thinks Jon Myles.

NAS (Network Attached Storage) device such as WD's 2 terabyte My Cloud for £100 and you'd have most of the functionality of the X40 with, to my ears, a slightly fuller and richer sound.

As for setting up music streaming at home have a look at our jargon-free Rediscover Your Music guide on the Hi-Fi World website for all you need know. You are correct that you'll need a computer to download high-resolution tracks before transferring them to your storage device.

As to why music retailers like HMV don't offer downloads in store, it's probably because they already have on-line sites for downloads so are reluctant to take up expensive High Street floorspace to sell something people can just as easily buy via their computer at home. **JM**

WALK AND PLAY

I have a Sony NW-A3000 Hard Disk Drive Walkman which I have used to give me a semblance of music for holidays so it is still going strong. Loading the music library on purchase I used high bit rate mp3 files being, at that time, somewhat lacking in knowledge about the various digital file options.



For music management JSymphonic is free and would suit Wayne Allen.

My operating system is Windows 7. I would like to install a different music library and load my player with FLAC lossless audio files but have the playing selection versatility of SonicStage which is no longer supported, I believe, by Sony. What software can I use on my player to achieve this?

Presumably, it would make sense to download and install the latest firmware update, should this be possible, prior to loading a new music library.

With my thanks in anticipation of your helpful reply,
Wayne Allen

You are correct - SonicStage is no longer supported by Sony and, as far as I recall, did not provide support for FLAC files nor Windows 7



Step up in sound quality from CD by going to high-resolution digital. The small FiiO X3 2nd Gen portable digital player costs just £150 yet with a good mains powered DAC delivers wonderful sound quality. This would be an upgrade for Nigel Sach.

anyway.

However if you trawl the internet there are alternative music management programmes available such as the free, open-source JSymphonic (available for Windows, Linux and Mac).

If anyone has any other solutions, please let us know. **JM**

POWER FACTOR

I read with interest the question posed by Mike Kershaw in his Power Down comment in the August issue 15. I too have been wondering about this very issue, as I am looking to upgrade amplifier /speakers or both to the next possible level.

I currently run a Cyrus 3 amplifier with PSR power supply via Chord Epic cables 8 metre in length to a pair of Monitor Audio Gold 20 floor standing speakers on spiked feet. Having spent the previous 3 years upgrading the Vinyl front end to a Michell Orbe with SME IV arm and Benz Micro Ruby extended cantilever M/C cartridge. This feeds a Tom Evans Groove M/C amp into the Cyrus 3 amp. All via Kimberkable interconnects from the cartridge to the Cyrus 3 amplifier.

Power has never been an issue as the Cyrus 3 amp never lights up more than 3 green LED's on the volume control, giving huge amounts of detail and presence with all musical tastes.

However, the majority of my record collection is Keyboard based with mainly Progressive rock groups from the 70s dominating the collection. That is not to say that vocals from Paul Simon and Allison Moyet are not stunning and crystal clear – hearing the breath between the words sung is just amazing.

One other upgrade that has made a vast difference is the Isotek Clean mains unit purchased from good old eBay.

So my question is: how do I improve the detail and musicality still further without paying huge sums of cash to take my system to the next level? I believe that 30 Watts would be ample for my room size of 14ftx10ftx9ft ceilings with a traditional wooden suspended floor, as the 50+watts from the Cyrus 3 is just not used. Its clarity and detail with all instruments sounding their best that I am looking for.

On the CD front I use a Rega Saturn R via Chord Cadenza reference interconnect to the Cyrus 3 amp.

So I would be grateful for feedback on my dilemma. I do not believe that the Valve route for amplification would give me the detail and clarity that I am looking for, but I am open to all suggestion from the informed team. Thanks for a fascinating and thought provoking magazine that never fails to stimulate many hours of enjoyment. Especially when re-reading the back catalogue while sitting in the loft!

Kind regards

**Nigel Sach
Warrington**

Hi Nigel. You already have a very good system that you are happy with and I don't see any obvious room for major improvement unless you go for the stars, after a successful chat with the bank manager. By this I mean popping into a dealer to hear Martin Logan Electromotion hybrid electrostatics, or perhaps Castle Avon 5's reviewed in our October 2015 issue – but you will have to turn volume up. Consider also a Sugden Class A amplifier like the Sapphire FBA-800 we often use for review purposes, as this is of limited power but superb quality.

Then there is the obvious suggestion of going hi-res and here I suggest you consider upgrading the Rega Saturn R by attaching an Audiolab M-DAC, that you can also feed with a little FiiO X3 2nd Gen. portable high-res digital player. You'll find modern hi-res digital downloads provide a useful step up in quality.

NK

COOLING OFF

Our system comprises a Byron Sonneteer, Michell Gyrodeck with Orbe turntable, SME IV arm with Benz Micro, AndIcon Audio PS3; Waterfall Victoria speakers with Tellurium Q Ultrablack cables, Tellurium Q Black and MIT AVI interconnects, MJ Acoustics Sub-woofer and Townshend Supertweeters; plus the above mentioned Icon Audio amplification. We listen to all types of music- classical, jazz, rock, and pop, albeit very little from the mid 1980's onwards, in a room roughly 12ftx30ft with concrete floor and walls.

We feel that the MB845s are a little bit of a liability, lovely though they are, and we're seriously considering the return to transistor-based amplification. Our price range is medium - high. What would you recommend, please?

Thanks for many years of excellent Hi-Fi magazines.

Regards

Jim & Cath

Hi both. OK, so you don't want to run a full blown valve amp anymore – and that is understandable. Valve amps of all hues are more “engaging” than tranny amps, meaning they can go wrong and you have to fix them/bias them, etc. The only problem is suggesting an alternative that you can audibly live with since your Icon Audio MB845 has quite a monumental sound.

My first suggestion is Quad QMP Elite monoblocks, because they are smooth, easy going powerful and dynamic sounding – the closest you will get to valves, from transistors. Creek amplifiers are also smooth yet powerful.

In Hi-Fi World towers we are all a little in awe of the McIntosh amplifiers coming our way, such as the MC152. It does not sound like a valve amplifier at all, in spite of using output transformers, but it offers enormous insight, detail and bass punch, rather shading all else. A tad expensive I know, but perhaps worth a listen. **NK**

AGAINST THE WALL

Great to see the system feature back, but having teased/tempted us with this ‘budget’ system, there appears to be no way of listening to it? Leaving aside the Onkyo streamer, my initial search can find no Hi-Fi shop that sells both Epos & Exposure, at least not in the London/ S. England region. Don't want this sound like a moan but perhaps it might have been more relevant to have tried with



Oodles of smooth, refined power makes Quad's QMP Elite monoblock power amplifiers a suitable replacement for valve amplifiers. Is this what Jim & Cath would like?

similar priced Creek 'amp, working on the basis that Creek/Epos are the same company, and therefore hearing the two together might be easier.

Also, is it possible to get some consistency in speaker reviews, specifically what placement is best? In the latest issue you review the Epos K3 but I can't see whether it needs to be some distance away from walls or close to, in order to extract maximum benefits, or did I miss it?

Cheers

Tim Jury

Hi Tim. Glad you enjoyed the Budget System article. It was based on components that I know work not

listening to the K1s on the end of an Evolution 50A or 100A amplifier would also give excellent results. **JM**

Hi Tim. By default loudspeakers are not designed for near-wall use. When they are designed for such positioning, however, we say so; our measurements clearly identify the slow low frequency roll off used to compensate for wall 'enhancement' and this is always identified within the Measured Performance section. That's the bit you missed!

Jon selected the items upon their merit, not upon availability. To select only items available within certain dealerships really wouldn't be about



We should have reviewed a Creek amp with an Epos loud-speaker, thinks Tim Jury – because they can be heard together at a dealer.

only well together but also offer excellent value for money and do, as said, offer more than the sum of their parts.

Unfortunately, it's frequently difficult for buyers to find dealers offering all the products they want to hear under one roof - and to add this parameter into the selection criteria would, I felt, have been unnecessarily restrictive.

However, I can confirm that Epos and Creek do work well together so

their sonic merit. However, a Creek / Epos system would work well; we favour both brands. **NK**

BASS & BITS

Over the last 6 months or so I've been upgrading my system. I used to have a Rega P5/Goldring 1042/Creek OBH-15 vinyl front end, with Apollo-R CD, playing into Mira 3 amp and R3 speakers. I now have the same CD player, but an RP8/Exact/Aria vinyl end, and my amp and speakers are Elex-R and RS5's.

Speaker cables are at present QED XT40, but I don't remember what my interconnects are, it was that long ago that I bought them!

It may not be the last word in hi-fi reproduction, but what it does, it does well. I am really pleased with the vinyl front end. It offers a degree of realism and a nice "out of the box" quality from the speakers. With complex albums, such as 'Introducing The Hardline According To Terence Trent D'Arby', there's a fairly hefty bass punch, good stereo imaging and realism, lovely treble and plenty of detail. The song 'Sign Your Name' has quite complex synth and vocal layering and it's possible to follow it all.

CD though is a more varied kettle of fish. With decent mastering (which normally means pre-2000 mastered CDs) I get pretty much the same sort of sound. A civilised presentation with a well-balanced frequency response and vocal presentation to die for. The speakers and cable are the last additions to the system, but even with the smaller R3s in place I've noticed a horrid tendency with modern CD mastering to somewhat over-emphasise the bass – presumably to appear "hi-fi" on small computer speakers and the like.

For example, the bass on albums like John Mayer's 'Battle Studies' or Brett Dennen's 'Smoke and Mirrors', which are reasonably "un-loudness warred" albums, sounds slightly detached from the rest of the mix.

With modern chart music, such as Lady Gaga, Kendrick Lamarr and Adam Lambert, it's a different story. The bass is so heavy (whilst other frequencies are relatively civilised) that I have to turn the volume right down from "as loud as I dare without disturbing the people in the flats below" – and then the presentation becomes lacklustre.

Playing what for me sounds like a good CD mastering of Joni Mitchell's 'Blue' album (pressing circa 1990s) I get a good frequency response but slightly hard sounding vocals and a feeling like a lid has been put on the music. Going with the lid analogy I have an ancient 70's vinyl pressing of the 'Blue' album where there's that communicative openness – like the steam has been allowed to escape from a boiling saucepan!

My other problem is that I have a growing number of iTunes downloads – films, songs and the like. I don't have a TV, so everything I want to watch comes from services such as the BBC iPlayer. At present I have a rather naff poor quality nameless brand 3.5mm lead going from my late 2013 27in iMac



Rega's DAC-R: I have "emptied my bank account of its last few coppers and added it to my system" says Mark Pearce.

to RCA analogue line in sockets on my Elex-R amp. Backing music, and sound effects from films is well-balanced and detailed. However, music and internet radio sounds veiled, compared to the great stereo imaging and realism of vinyl and CD. Moreover, there is more of the squashing effect so that performers sound half-sized, like The Munchkins on the Wizard of Oz! Well maybe not that small, but there is a definite sense of lack of scale. I am aware that part of the reason that the audio from iPlayer TV and iTunes films sounds acceptable is illusion – there is the visual aspect that distracts you from the audio. I know I can do better however.

I want to solve both the bass and download issue as economically as possible, since funds are now virtually exhausted. Would a better analogue cable make the right improvements from the iMac download side of things? If so, which cable do you recommend? It needs to be about 2, maybe 2.5m in length.

With regards to the bass issue, I want better integration and control. Could I solve all my issues by adding the Rega DAC-R to the system? I think the iMac analogue out doubles as a digital output socket – correct me if I'm wrong. I don't understand much about computer files and streaming at all.

I don't want the earth, just that whether it's an iTunes film, AIFF file, WAV file, Apple lossless file, 256kbps purchase download, or internet radio or iPlayer TV program, I can press play on the iMac and forget it, hoping that the DAC-R would be able to cope with whatever is thrown at it.

I know I have a lot of questions and possibly haven't made tons of sense, but I hope you will be able to sort me out. It's a minor tweak I'm after with the bass in my main system and that's the one I'm most anxious to solve.

**Mark Pearce,
Hastings,
East Sussex**



"I think the iMac analogue out doubles as a digital output socket – correct me if I'm wrong", says Mark Pearce. Most Macs have a dual-purpose 3.5mm headphone socket with optical digital output buried inside. You need a special adaptor – shown here – to use it.

...AND MORE

Further to my letter above, I decided the other day to demo the Rega DAC-R at my local Audio-T and have emptied my bank account of its last few coppers and added it to my system. It has had the required effect of controlling bass, plus it resolves more detail and improves stereo imaging. In short it makes what was already a brilliant CD player into a corkingly good one!

However I would still like to know your thoughts on Rega Duet Speaker Cable.

The digital end to my system – which is most relevant to the rest of this letter – is the Rega Apollo-R CD player plus the DAC-R. I stream anything I want to watch from my iMac via services such as the BBC iPlayer. Previously I connected the iMac to my hi-fi using a rather dodgy analogue 3.5mm to RCA cable, into the Elex-R amp. This was OK, but the improvement the DAC-R has made to the playback quality of digital computer content is noticeable and makes it a very cost effective and simple solution.

So, coming to the point of my letter, I decided to download a high-resolution album from the online store HD Tracks. I chose a 24-bit/96k copy of an Isley Brothers album originally released in 1975. I copied the file into my iTunes library and started it off playing. I expected the DAC-R to “know” that it was being fed a hi-res file and light up accordingly. However the sample rate light stayed defiantly on 44.1-48k. I checked the properties of the files and iTunes was indeed playing 24bit/96k files at CD quality resolution. The sound was noticeably more open and “uncompressed sounding” than a 256kbps iTunes download, but I could have achieved that by ripping a CD at WAV or AIFF.

A bit of internet digging threw up an article from Apple suggesting the use of a utility (part of the Mac’s OS-X so no download necessary) called Audio Midi Set Up which can be accessed by using Spotlight Search and typing in the first few letters of the utility’s name. Here, you can configure the optical out to output the required 96k sample rate. But toggling between 44.1 and 96k made no appreciable difference, other than making the DAC-R switch its lights to indicate that it was being fed a different sample rate. Also, playing a “normal” 16/44 file worked with Audio Midi Set Up set to 96k, but the DAC-R didn’t swap lights back to 44.1k!

So what I assume is happening is the iMac is upsampling everything to

96k before it is being sent to the DAC-R. Is there any benefit to doing this, or indeed buying hi-res downloads, especially as with that album I couldn’t tell the difference?

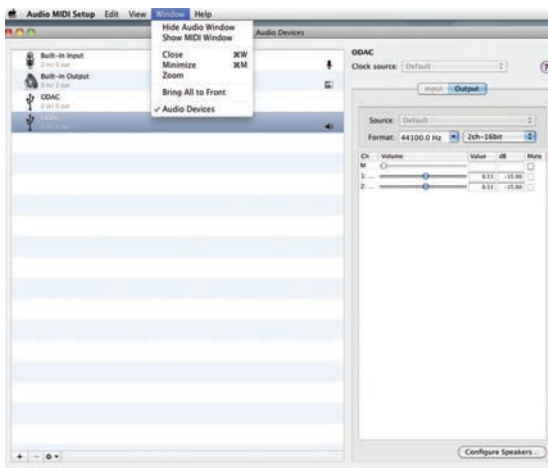
**Mark Pearce,
Hastings, East
Sussex**

Hi Mark. I’m glad Rega’s DAC-R solved bass quality issues for you. That does surprise me because I would have suspected loudspeaker/room matching issues if some of the albums you mention are overpoweringly bass heavy. The Castle Avon 5s I reviewed in our October 2015 issue suit medium-sized rooms that boom, using a well damped transmission line to deliver well damped bass that counter-balances what the room is doing.

As you have discovered, Mac’s operating system OS-X has both a ‘Sound’ control panel in System Preferences, and the peculiar Audio/Midi Setup control panel buried in the Utilities folder; that itself is in the Applications folder. And if it fails to appear on screen after being fired up, go to WWindow and specifically select Audio window or the screen remains perplexingly blank – oh, weird!

As you say, this panel fixes the output sample rate, so as to match any downstream device. If you set it to 96kHz then it stays there and that is what is sent, even when playing CD, so the Rega’s sample rate light will not change. You won’t hear an improvement in sound quality though.

What you have to bear in mind with modern hi-res digital



The important Audio-MIDI control panel of a Mac is buried in a Utilities folder, that itself is in an Applications folder – usually at the end of a long list of files. You have to dig hard to find this.

transcriptions of old classics is that you get to hear the rawness of the original performances, often using Westrex valve studio equipment, without all the infernal editing that so wrecks modern music – but you also get to hear tape hiss, drop outs and other imperfections. All-in-all though, I love these modern transcriptions of old analogue into quality 24bit digital files. It brings the life and soul of historic performances back, making the experience of listening to music more moving. **NK**

DUTCH DILEMMA

I read your magazine in awe of the many readers who clearly are so knowledgeable on which components are suitable to go with what and the probability of it maximising the whole listening experience being extremely high. I am preparing to travel round Europe on a Dutch barge and would like to enjoy my music along the way. For my part I would like after many years of being in the hi-fi wilderness to create, procure a system that in part



The EAR Yoshino V20 used paralld ECC83 small-signal triodes to provide 20 Watts. Shown here is the similar V12.

Letters On-Line!

You can now read our Letters on-line, from the last issue back to March 2010. That's a treasure trove of information and advice to our readers, as well as a fascinating catalogue of reader's systems and views. There's mountains of buying information, all just a click away on your computer or i-Pad. Have fun!

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DP David Price, editor; **NK** Noel Keywood, publisher; **PR** Paul Rigby, reviewer; **TB** Tony Bolton, reviewer; **RT** Rafael Todes, reviewer (Allegrì String Quartet); **AS** Adam Smith, reviewer; **DC** Dave Cawley, Sound Hi-Fi, World Design, etc.

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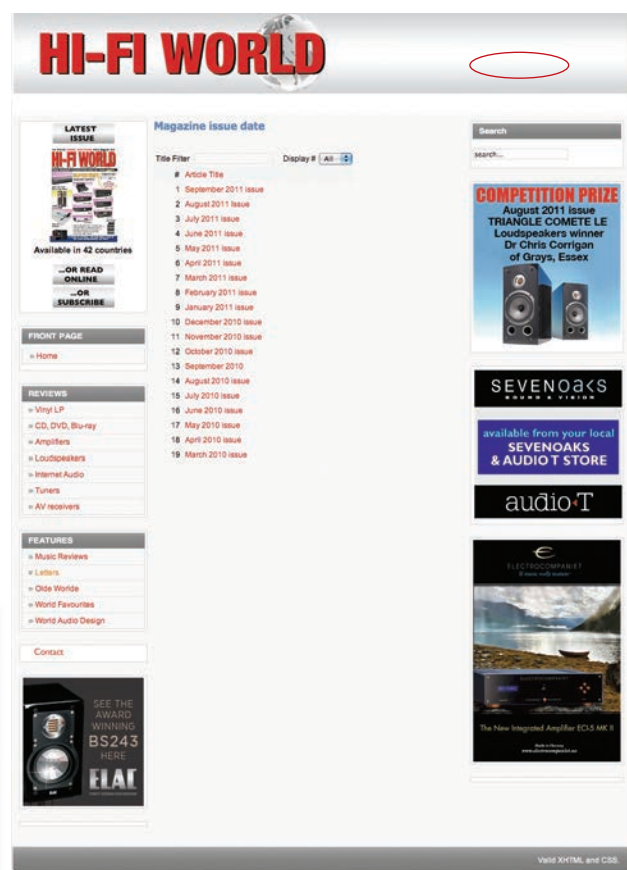
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The Unison Research S9 uses big SV-572-10 output triodes, working in parallel Single-Ended arrangement. It is big, very heavy and not very powerful at 30 Watts. Is this right for a Dutch barge?

sounds nice and also remains pleasing on the eye, odd I know but I am of an age where this is probably going to be my final fling at such a project, so here we go.

It is my intention to base the music storage round an Apple Mac Mini with solid state drive, couple this with a Dac such as a Chord Hugo and from this lies a green field site. I have made my mind up that I would prefer a valve amp set up, and am prepared to spend around £4000 or a little more if convinced, so my first question being should I go for new or a second hand unit for instance, Unison Research S9, Ear Yoshino V20 or V12 Art Audio Jota Pathos twin towers amplifier?

If I then look at speakers due to room constraints and personal preference bookshelf would appear to be the way forward. I have looked at Usher, Focal but I am leaning towards the Opera Callas. If you were to consider my ideas, constraints and idiosyncrasies am I barking completely up the wrong tree or would such a system have merits? Sorry my taste in music covers

Soul, Jazz. Folk Reggae and light Opera.
Regards

Philip Winfield

Hi Philip – your ideas all look reasonable to me. Small loudspeakers are insensitive and often you're looking at 50 Watts or more to drive them, but then again you have a small space, which counteracts this need. Generally though, I suggest you consider 40 Watt models that use high power output tetrodes, like the U.S. 6550 or British KT88. That puts a question mark over the Unison Research S9 that uses a very exotic output arrangement of SV572-10 triodes in paralleled single-ended mode. They look nice and sound it too, but you won't be playing loud. And I could say that of the unusual EAR Yoshino V20 that, very unusually, uses banks of ECC83 small-signal pentodes as output valves. The ART Audio Twin Towers amplifier looks similarly power limited, although 40 Watts is claimed.

You appear to be after a valve

amplifier that looks exotic, which is fine providing you bear in mind that volume levels are likely to be limited. In a barge I suspect this doesn't matter, but then I have no experience and don't know! Similarly, I do not know what sort of mains power you have available and how much it costs, or whether this is an issue. And then there is heat generation in a small space. You may need to bear all this in mind before launching out into exotica. **NK**

ON STREAMING

I was reading the article by Jon Myles about music streaming with great interest – September issue p74-77 – and I am very keen to rip all my CDs to a NAS set-up.

I was thinking of purchasing the Arcam CDS27 to enable me to do this (already have the Arcam A19 Amplifier & Arcam D33 DAC in my system). Or would it be better value to adopt the Onkyo CD Player/ network streamer that you have suggested?

You may not be able to give me direct advice but any thoughts you have on the subject I would be greatly interested to hear.

Thanks,

Jim McLeod

Hi Jim. First off, I would greatly encourage you to add streaming capability to your system. If your experience is anything like mine, you'll find yourself listening to a great deal more music and also discovering some long-forgotten gems amongst your CD collection.

The cost of NAS drives continues to fall – and 2TB of storage can now be purchased for less than £100. I have been using a WD My Book Live for over two years now, with not one glitch.

Of course, ripping your CD collection to the drive takes time and necessitates the use of a computer – but once done it's easy to add to when you purchase a new disc or download some tracks.

As for the Arcam and Onkyo CD players/streamers you mention both are fine products, the Onkyo being an absolute bargain at £350.

However, as you already have an Arcam-based system and presumably like its sound you might be better off going for the CDS27 which has the company's traditional detailed, yet smooth and assured presentation.

Whichever you choose, enjoy your journey into the world of streaming music. **JM**



"You might be better off going for Arcam's CDS27" we tell Jim McLeod, who's looking to get a streamer.

Box Clever

Vinyl replay and recording, high-resolution digital, streaming and amplification all converge in Entotem's new Plato. Jon Myles explains all.

There's never been more ways to listen to and store music at home. Once it was limited to vinyl or the radio. While those two mediums are still going strong they've now been joined by CD, Network Attached Storage (NAS) devices, iPods, high-resolution digital music players, internet radio, home computers, streaming services and...well, the list seems to grow ever longer each passing year.

And while that gives consumers a welcome degree of choice, it also means our music collections are becoming increasingly fractured between various different formats. Rare, nowadays, is the listener whose entire library is stored on just one physical format such as LP or CD.

The obvious downside to this is the increasing number of hi-fi components needed to play all these

different formats. My own system, for example, comprises a turntable, DAC, CD player, two NAS drives, streamer, amplifier and a couple of high-resolution portable digital music players. And, of course, all the associated cables to tie everything together.

So how convenient would it be if you could slim this down to a single box which not only looks good but sounds good as well? That's the thinking behind the new Plato from UK-based company Entotem.

In short, it's a music server that incorporates 2TB of hard disk storage alongside networking capability, an MM/MC phono stage, recording function, 24bit/192kHz DAC and a 45 Watts per channel amplifier – all in a box measuring just 370mm x 130mm x 300mm (W/H/D) and costing £3600 (there's also an alternative version which omits the

amplifier section available for £2700).

Added to this is a 5" TFT LCD touch-panel front screen and an Android-based app for phone/tablet devices (iOS to follow shortly, I'm told) which makes control of the unit relatively simple and allows regular software upgrades.

All these features, of course, would be pointless if the Plato wasn't, at its heart, a decent hi-fi component – which, I'm glad to say, it is.

Entotem is a relatively new company – formed just two years ago by four music-loving entrepreneurs to design and develop a multimedia home entertainment system which integrates both high-resolution audio playback and high-definition video (see box-out for more on the latter).

The company's vision was a system that combined the ability to convert, play and record vinyl alongside network streaming



capability, digital inputs and amplification to make a one-stop solution for music lovers.

If that makes the Plato sound a complex beast, well, it is – boasting a range of capabilities I've never come across in a single unit before. However, Entotem has obviously put significant work into the user interface as it is remarkably easy to operate, with an intuitive control structure that anyone familiar with an Android tablet will get to grips with within minutes.

From this you can access the various connections – optical and coaxial in/outs, line level and MM/MC phono, HDMI, ethernet network and pre-outs – as well as control the volume. As it's DLNA-equipped the Plato will also look up other uPnP devices on your network so it can play their content – although it does need a wired connection.

The speaker sockets are of the plug-and-twist Neutrik variety which, while rare, do provide a secure fit. The pre-production unit we had for review came in a mustard colour but Entotem say the final version will ship in black with custom finishes a possibility in the future.

RECORDING

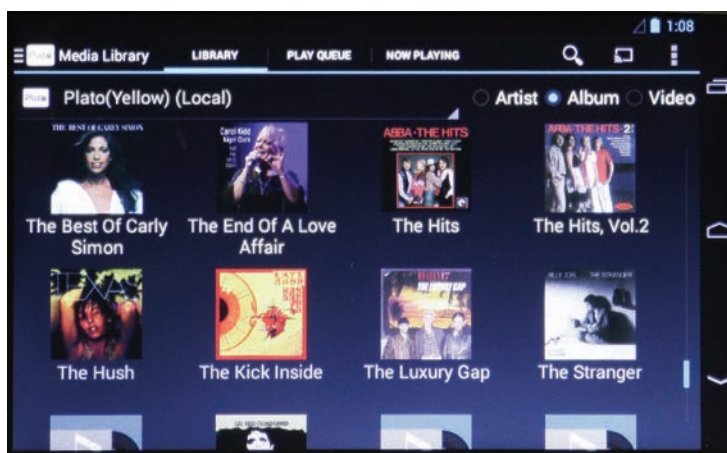
With the Plato connected to the network, the first task is to experiment with its stand-out feature – recording vinyl in high-resolution 24bit/192kHz resolution to the internal 2TB hard disk.

And this is where things get very clever. Plugging in Hi-Fi World's reference Timestep Evo turntable with SME309 arm and Ortofon A95 cartridge the Plato's control app let us select input impedance as well as gain and – if desired – bring in a rumble filter. Once the needle hits the groove initiating recording is simply a matter of pressing a red dot on the tablet's touchscreen.

As this happens the Plato automatically sends a sample of the track to the on-line Gracenote music database and – hey presto! – album details and artwork appear on the unit's front panel screen and the tablet. It really is that simple. What's more Gracenote is remarkably accurate – only failing on some of my most obscure selections.

The same process works for importing music from cassette or CD players, while files can also be saved to the disk from the front USB socket.

After that, all albums appear



The front panel touch-screen TFT display shows full album artwork and titles to make sorting through your music collection quick and easy...

under a Media Library section of the control application which is fully searchable by artist, genre, track name etc.

SOUND QUALITY

With the facilities on offer you'd be forgiven for thinking that sound quality might have taken a back seat. Fortunately, it hasn't.

Its amplifier section is conservatively rated (see Measured Performance for full details) yet has a big, clean and exuberant quality to it.

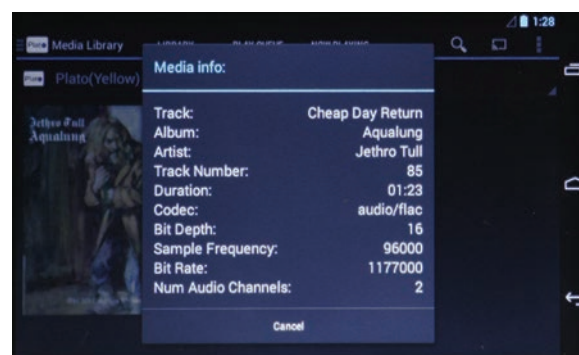
Playing back a 24bit/192kHz rip of Mark Knopfler's 'Kill To Get Crimson' the quality of the production on this album was more than evident. Here, the leading edges of guitar notes rang true while the subtle rhythm section was projected tightly between the loudspeakers.

Moving onto something with more low-end power the Plato brought out decent bass from a pair of XTZ Master Series M2 standmounts (see review elsewhere this issue). If anything it tends a little towards the dry side – but that meant it gave a taut, tuneful presentation to King Tubby's powerful 'Dub Fever' collection.

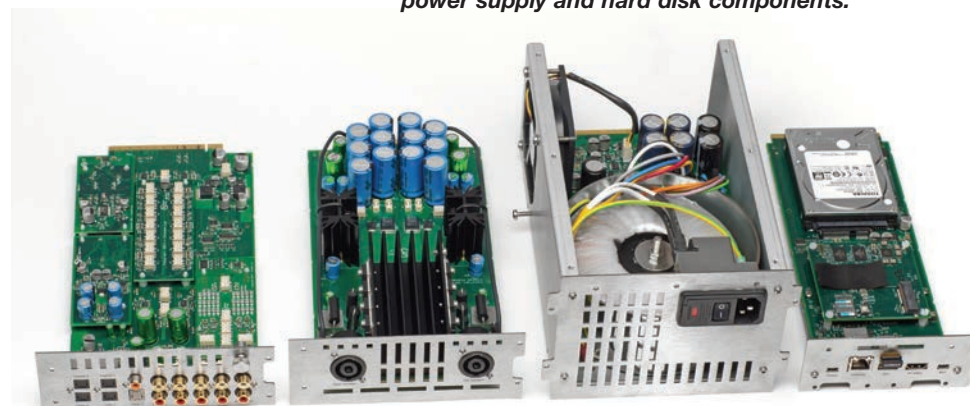
There's also drive and a fine

sense of tempo on offer. Fed Led Zeppelin's 'Black Dog' through the digital out of an Oppo CD player the Plato grabbed hold of the track and pushed it along with verve, without sounding congested or forced. Indeed, the DAC section is extremely composed and free from any digital harshness, meaning various instruments are easy to follow, even in the densest of mixes.

If there's any criticism to be made it's that the software could be slightly glitchy at times – with an occasional lag between inputting instructions on the tablet and the



...and can also display track information including artist, title, sample rate and file type (above) while (below) are the Plato's modular-style electronics, power supply and hard disk components.





UNISON
RESEARCH

For The Love Of Valves

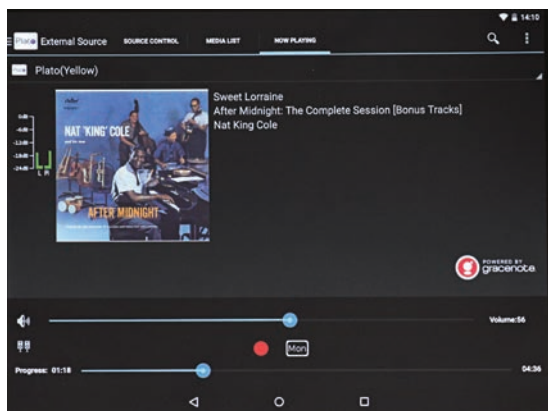
Ever since their humble beginnings in 1987, Unison Research have flown the flag for valve technology in high-end audio applications. Their years of meticulous testing and development has produced a contemporary range of pure valve amplifiers that can suit any serious audiophile.

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The full Valve range is available across the UK now.

www.unisonresearch.co.uk

* Model Shown: Sinfonia Anniversary (£5,000 SRP)



The free Android app makes control of the Plato via a tablet a breeze. An iOS version is set to follow shortly.



A full complement of digital and analogue inputs on the rear panel are joined, unusually, by a pair of Neutrik-style loudspeaker connections.

player responding. Entotem do say, however, that this is a pre-production issue that will have been sorted by the time the first units reach the

stores.

Apart from that, though, there's nothing not to like about the Plato. It'll record your vinyl in high-

resolution, play records, act as a music server and connect to your home network all in one package that is user-friendly and extremely easy to operate.

CONCLUSION

This could well be something of a landmark product in terms of flexibility and the combination of digital technology with legacy analogue capability. Add in an intuitive interface and the promise of regular software updates and Plato could just be one of the most exciting products of the year.

VIDEO PLAYBACK

While the sonic side of the Plato will be of greatest interest to hi-fi enthusiasts, the Plato does have some other interesting tricks up its sleeve.

For not only will it store music – but also high-resolution video.

That means your movie collection can also reside on the hard disk for playback via the HDMI output or streaming to a tablet or smart TV via wi-fi.

Titles have to be loaded via the USB socket on the front of the unit: .mov, mpeg2, mpeg4 H263 and H264.

Playback of a couple of episodes of Doctor Who proved extremely impressive, with pin-sharp images and smooth scrolling.

It's not a feature I'd use much myself – but it could prove a clinching factor for partners or younger members of the family if you're considering purchasing.

Also, as it connects to other DLNA-equipped kit, the Plato can communicate with the likes of Sonos to give different music in various rooms around the house, while internet radio and the likes of Spotify can also be played.

MEASURED PERFORMANCE

The Plato's power amplifier produced 66 Watts into an 8 Ohm load and 110 Watts into 4 Ohms, enough to drive most loudspeakers to very high volume in the average sized room. Distortion levels were very low in the midband and at high frequencies; there is little sign of crossover products in our distortion analysis, the sound will be clean and lacking any sign of harshness. The amplifier's output impedance was low too, resulting in a high damping factor figure of 40, so the amplifier will have relatively tight bass. Frequency response was very wide, stretching from below 2Hz up to 71kHz (-1dB).

Phono stage equalisation was accurate, resulting in flat frequency response, the warp filter acting sharply below 20Hz. Input sensitivity was 5mV and 0.7mV max for MM/MC respectively – low values – and overload levels fairly limited at 2.6mV and 20mV respectively too; an Ortofon 2M red produces up to 35mV. The change from MM to MC sometimes didn't happen immediately either, so there are niggles here. Noise was very low.

The S/PDIF digital inputs were inconsistent, with the electrical connection via phono socket working

to 96kHz sample rate maximum, whilst the optical input managed 176.4kHz maximum, neither working with a 192kHz sample rate signal. With 24/96 PCM digital, distortion measured a low 0.03% and EIAJ Dynamic Range was commensurately high at 116dB – a good value up with market norms, if not the 120+dB nowadays possible from the best chips (ESS 9018, Texas Instruments PCM1795). With CD (16/44.1) however, EIAJ Dynamic Range was a high 103dB, so the Plato matches the best here.

Frequency response at 176.4kHz sample rate extended to 42kHz before rolling away slowly, about as expected using slow, but well damped filtering.

The Plato is a complex and ambitious product that worked well all round. Its phono stage in particular, with Gracenote ability to identify music and bring up artwork etc was especially comprehensive, if in need of a little buffing up of sensitivity and overload levels. **NK**

Power 66watts

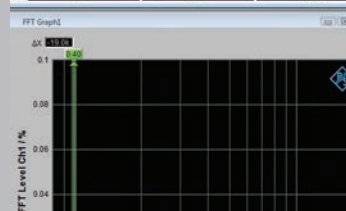
CD/tuner/aux.
Frequency response 2Hz-71kHz
Separation 95dB
Noise -114dB

Distortion 0.04%
Sensitivity 600mV

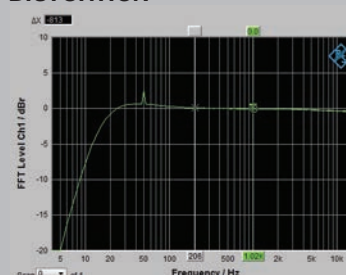
Disc
Frequency response 5Hz-20kHz
Separation 68dB
Noise (e.i.n.) 0.08/0.22µV
Distortion 0.05%
Sensitivity (MM/MC) 5/0.7mV
Overload (MM/MC) 2.6/20mV

FREQUENCY RESPONSE

THD-Hz	Level RMS	Frequency
Ch1 -56.730 dB	Ch2 -37.144 dB	997.01 Hz
Ch1 OFF	Ch2 OFF	Ch3 OFF



DISTORTION



ENTOTEM PLATO
£3600 (WITH
AMPLIFIER
SECTION, £2700
WITHOUT)



OUTSTANDING - amongst the best

VERDICT

A groundbreaking product from a new company that is ideal for those looking to combine digital and analogue replay.

FOR

- versatility
- vinyl playback/recording
- digital inputs
- DLNA

AGAINST

- minor software issues

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KEF's M-factor

There's more to KEF than loudspeakers, Martin Pipe discovers.

Many long-term hi-fi enthusiasts will have, at some time, owned speakers made by KEF – one of the biggest brands in the business. So the company's move into the booming headphones market was inevitable. Its first 'cans' were the well-received £250 'on-ear' M500s and the 'in-ear' M200 models.

Its latest effort, the attractively-finished M400s, are a (slightly) cost-reduced version of the M500s. And there are numerous similarities – the overall 'look' and comfortable on-ear design, memory-foam earpads, a choice of colours (four here), 40mm drive units with powerful neodymium magnets and a detachable cable.

The latter has a 'bump' that contains a hands-free microphone and basic audio controls for Apple smart-device users. A 6.3mm adaptor for conventional hi-fi gear isn't supplied, although you do get one that enables you to confirm just how awful the average in-flight entertainment system sounds. The phones neatly fold up, so they take up little stowage. Sensibly, KEF supply a soft zip-up carrying case.

Sensitivity is, at 101.5dB (IEC-3), broadly-comparable with competing headphones. But even with the clever use of memory-foam to accommodate your ears, the M400s don't 'seal out' the outside world quite as effectively as circumaural closed-back designs – as a direct comparison with the Oppo PM3s reveals. This has implications for sound 'leakage', and for that matter the volume levels you're compelled to set when ambient noise levels are high.

In sonic terms, the M400s are hardly neutral. Their character is rather forward – to the point of brashness on occasions; there's a distinct upper mid-band emphasis that benefits some instruments, notably percussion. Vocals are also more prominent, which can improve intelligibility. In other words, presentation is rather different to the 'all-bass-and-treble' artificiality of some headphones.

That said, the M400s don't suffer in the bass department. KEF have however gone for subtlety rather than overdoing it, in an attempt to impress with certain genres of dance music. This was particular evident with Elgar's 'Pomp and Circumstance March No. 1' as experienced during the Last Night of the Proms (Rotel RT930AX tuner with a Benchmark DAC2 HGC performing headphone-amplifier duties).

During this performance, the Royal Albert Hall's sublime Grand Organ didn't dominate. Those lower notes were instead reproduced with depth. There's also a crisp treble which, along with the prominent upper-midband, helped to drive along rhythms. Talking Heads' 'Born Under

Punches' also benefitted from this.

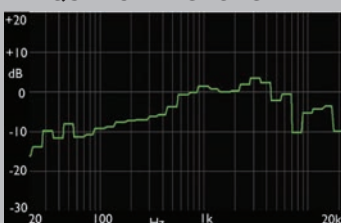
Detailing is also strong, for much the same reason, and you can delight in picking apart the instrumental layers of a track or performance. However, you must always ensure the cups are directly over your ears. Fail to do so, and a nasty 'phasiness' detracts from sound quality.

Another problem is that, even with the headband tightened, the M400s have a tendency to slip off if you're engaged in physical activity – this was particularly problematic when using the M400s down the gym when sometimes they would slide off altogether. But when travelling on public transport or relaxing at home, all was well.

MEASURED PERFORMANCE

Output of the M400s rolls down quite strongly below 600Hz compared to other

FREQUENCY RESPONSE



headphones, that usually measure flat below 1kHz, so the M400s will have less bass. Upper treble rolled away too.

Impedance measured 45 Ohms resistive. Sensitivity was good, 92.5dB Sound Pressure Level being produced by 1mW of input.

The M400s have a prominent midband and this will be obvious subjectively, aiding detail and analysis. But bass is not as prominent as others.

NK



KEF M400 £200



EXCELLENT - extremely capable.

VERDICT

They have a character of their own, but that's not necessarily a bad thing

FOR

- plenty of 'snap' and presence
- highly detailed
- foldable design and detachable cable

AGAINST

- can slip off
- need to be positioned correctly on-ear
- lacking neutrality

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Head Honcho

Creek's new OBH-21mk2 headphone amplifier is simple yet sweet sounding, says Jon Myles.

With headphone listening – be it at home or on the go – enjoying something of a resurgence these days, more and more people are looking to dedicated amplifiers to get the most from the experience.

Yes, many integrated amplifiers include their own headphone circuit but the quality can be variable, so for anyone after the very best sound from their expensive set of 'cans' a standalone unit is the way forward.

And there's plenty of them out there at the moment – from feature-packed full-sized components boasting their own in-built DACs, tone controls and sophisticated options such as crossfeed, to more minimalist designs with simply a few inputs and a volume knob.

One look at the Creek OBH-21mk2 on review here will tell you it resides firmly in the latter

category. It's an upgraded version of the company's already successful OBH-21SE headphone amplifier and consists of a slim metal box measuring a svelte 95mm x 60mm x 180mm (H/W/D) with just a rotary volume control, two 6.3mm headphone jacks and a small blue operating light on the fascia.

At the rear are three pairs of RCA sockets incorporating a line-level input, a loop-out for chain-linking to other components and a pre-out to enable the Creek to be used as a preamplifier if so desired.

A set of easily-accessible DIP switches on the base of the unit allows for various gain settings to match output with different headphones – 0dB, 6dB, 10dB and 12.5dB. Cleverly, two more switches enable attenuation of the pre-amp output without altering the headphone settings.

Power comes from a wall-wart

style 24V supply and while the Creek is relatively compact it's reassuringly weighty at 630g, with cushioned metal feet providing a firm foundation on whatever surface you place it on.

So while not the flashiest headphone amplifier around, the Creek OBH-21mk2 is decidedly well-built for its £325 price with a purposeful look – and its simplicity makes operation refreshingly simple.

SOUND QUALITY

Creek has been producing headphone amplifiers since 1993 so it's fair to say they have a pretty good idea what they are doing.

And straight from the off the OBH-21 made a good impression. Hooked up to a Naim NDX streamer and fed a selection of material ranging from Red Book CD to high-resolution 24bit/192kHz files, it brought the best out of whatever headphones it was connected to.



Much like the company's bigger integrated amplifiers, the Creek has a very natural, organic sound to it with little evidence of transistor harshness.

On a pair of Oppo's PM2 planar magnetic 'phones there was a good sense of depth and punch to the low-end on The Chemical Brother's 'Block Rockin' Beats'. The electronic bass lines had both shape and power and they never wallowed.

The Oppos can be a little too smooth for my tastes at times – seeming to prioritise midband warmth over absolute bite – but the Creek exerted a firm grip on them, seeming to add some welcome sparkle to the top-end.

On Tommy Smith's 'Azure' the saxophone lines were well-etched with a definition to the leading edges of the notes that I'd not heard previously through the Oppos.

"The midband had a slight warmth to it but not so much that it ever sounded bland while treble was clean and extended"

Switching to a pair of more neutral-sounding AKG K702 headphones, the Creek showed it has plentiful reserves of power on tap. These are tremendously revealing 'phones yet a little insensitive and in need of some quality amplification to give their best.

But with the gain increased to 10dB on the Creek the AKGs went loud with ease – the OBH-21 bringing out masses of detail in even the most complex of mixes. On Ornette Coleman's dense 'Free Jazz' outing – which features two separate quartets playing in each channel – there was ample air and space around the various instruments, allowing me to track the different musical lines with ease.

The midband had a slight warmth to it, but not so much that it ever sounded bland, while treble was clean and extended. The only criticism is that the lack of a crossfeed facility – which subtly blends elements of each channel together – meant that the Creek did have a stark left/right separation on this piece.

But that's a minor quibble – and one that rarely raised its head, as the Creek is adept at getting the best out of whatever 'phones you attach to it. Swapping over-ears for a pair of



The rear of the Creek features an on/off switch, power socket and line-level input, as well as loop-out and pre-out sockets.

Noble's new Savant in-ear monitors (see review elsewhere this issue) and the 24/88.2 version of Daft Punk's 'Random Access Memories' positively romped along – the Creek propelling

on the end of the excellent FiiO X3 2nd Generation portable player with good results for the past few weeks but the Creek seemed to take them to another level – imbuing the sound with more presence and realism. Which, after all, is what headphone listening should be all about.

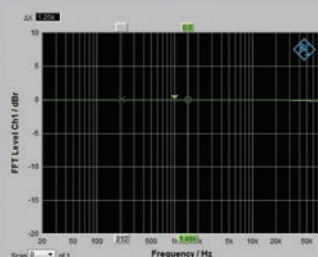
CONCLUSION

The Creek OBH-21mk2 might not be the most feature-packed headphone amplifier you can buy, but it is certainly one of the best sounding at its price. Detailed and punchy with an organic, free-flowing sound it is eminently capable of driving whatever 'phones you care to partner it with.

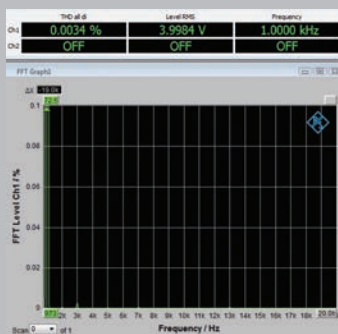
MEASURED PERFORMANCE

From its headphone output the OBH-21mk2 measured flat from 2Hz to 100kHz and maintained this result as volume was steadily reduced over its full range.

FREQUENCY RESPONSE



DISTORTION



Changing gain using the underside DIP switches also made no difference to frequency response.

Distortion was a minimal 0.003% at 1V out and again, the gain setting made no significant difference.

As stated in the specs the unit provides no gain (0dB), up to x4 gain (12dB) selected by DIP switches, from input to headphone jack output, and it would swing up to 3V out easily, distortion starting to rise through 0.2% at this level. This is plenty enough, even for insensitive planar magnetic headphones from Oppo and Audeze. However, overload was slow and up to 6V was available before distortion rose to 1%. Noise was minimal at -117dB.

The OBH-21mk2 measured very well all round. **NK**

Frequency response	3Hz-80kHz
Separation	92dB
Noise	-117dBdB
Distortion	0.003%
Gain	x4 (12dB)
Output	3V

CREEK OBH-21mk2 £325



OUTSTANDING - amongst the best.

VALUE - keenly priced

VERDICT

Simple yet sonically superb. The Creek is a tremendously impressive headphone amplifier which allies power with musical poise.

FOR

- drive
- detail
- smooth sound

AGAINST

- minimal features

Creek Audio
+44 (0) 1442 260146
www.creekaudio.com

German Physiks Omnidirectional Loudspeakers



Unique DDD design produces a very wide frequency range from a single driver

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AC/HFW/86

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AC/HFW/85

Superb Savant

Jon Myles takes a listen to Noble Audio's latest universal-fit in-ear monitor – and comes away hugely impressed.

A few months ago I was fortunate enough to have the chance to review a pair of Noble Audio's flagship K10 custom in-ear monitors (CIEMs). Featuring 10 drivers per side and moulded to exactly fit the shape of my left and right pinnae and ear canals, they've become my sonic reference for headphone/earphone listening.

There's really nothing to fault them, but at over £1500 a pair they're obviously not in everybody's price range. Fortunately, though, Noble also produces a range of in-ear monitors costing a lot less – of which the Savant is the latest model. It's available as a CIEM for £1050 – but the universal fit model on review here comes priced at a reasonable £399.

Unusually for Noble, the company makes no mention of the number of drivers employed in the Savant (other models use between three and 10). Instead it restricts itself to saying the new 'phones are the most subjectively balanced in-ear monitors yet produced by company founder and renowned audiologist Dr John Moulton.

Not quite as surprisingly, they follow the traditional Noble form factor for IEMs – a large shell with pentalobe screws on the fascia with a tapering dual-bore nozzle to which you can fit the included assortment of eartips. I tried them all and eventually settled on the medium blue tips but, as ever, this is very much dependent on your own preferences.



SOUND QUALITY

Moving from Led Zeppelin to Eleanor McEvoy and then Mahler in quick succession lets you know what these earphones are all about – balance and openness.

They don't over-egg any aspect of the sonic spectrum; what they do extremely well is allow music to breathe.

Listening to Zeppelin's 'When The Levee Breaks' (24/96) I initially thought there was a lack of real low-end punch to the delivery.

But over time it became clear that the apparent absence of punch is actually an absence of artificial emphasis. The Savants do not pander to those who want a false bass boost – instead they simply relay what is on the recording.

This same quality suffuses the mid and treble too – where the Nobles are gloriously detailed and expansive. On Eleanor McEvoy's 'I've Got You To See Me Through' the

piano and bass lines are vibrant – and anchored well in their own space. Here the Savants are good at creating a wide soundstage that fools you into thinking you could actually be listening to loudspeakers instead of in-ear monitors – a trick not all IEMs manage to pull off.

That quality pays dividends with complex orchestral music such as Mahler's '4th Symphony' where even on the crushing crescendos it's easy to make out the individual instruments. Violins especially have an air and separation around them that is rare on an earphone at this price.

Indeed, the Savants have a naturalness and thoroughly open and engaging sound that few other in-ear monitors at their price can match – and would prove tough competition for some rivals costing £600 or more.

CONCLUSION

Noble seem to be setting the standard for in-ear monitors at the moment. The new Savant is not only well-built, it is also sonically well-balanced with a wide open soundstage and clarity that belies its relatively modest price.

NOBLE SAVANT £399



OUTSTANDING - amongst the best

VALUE - keenly priced

VERDICT

A quality, well-balanced in-ear monitor that won't break the bank. Stands comparison with models costing twice its price.

FOR

- clean, open sound
- no artificial bass boost
- quality build

AGAINST

- nothing at the price

Noble Audio
www.nobleaudio.co.uk



Turntables
Best turntable £800+
Clearaudio Concept



Musical Freedom

The luxurious, leather-clad M3-Freedom wireless loudspeaker sounds as good as it looks, says Jon Myles.



If there's one segment of the home audio market that can be said to be enjoying something of a boom at the moment it's undoubtedly wireless loudspeaker systems.

Browse the shelves of electrical retailers or look on-line and there's no end of choice available for prospective purchasers — ranging from models by established hi-fi manufacturers such as Naim's excellent Muso at £899 to a host of cheaper alternatives from relatively more recent entrants.

While that's good news for us consumers, it also means it's becoming harder for new products to stand out from the crowd and catch our eyes — or, more importantly, ears!

But that's just what global technology and design brand GGMM is hoping to do with its new M-3 model and its promise of distinctive design and good sound quality.

And straight out of the box it undeniably makes a good impression. The slightly retro design combines a handcrafted full luxury leather exterior with a quality brushed aluminium fascia that, taken together, exudes quality.

Inside the 6.69" x 13.39" x 5.51" (H/W/D) cabinet is a 30 Watt digital amplifier that powers two mid/

bass drivers and pair of tweeters — all constructed from a carbon fibre material.

Wireless music streaming for iOS/Android phones and tablets and Mac/PC computers is available from a home network or by pairing in direct mode, while the M-3 also supports Apple AirPlay and the rear panel includes a 3.5mm jack socket for direct connection of other devices.

A single top-mounted rotary control can be used to adjust volume but — as is usual — the easiest method of operation is via GGMM's free app which is well laid-out and admirably intuitive.

SOUND QUALITY

Site the M-3 on a solid surface, pair it with your device (in my case a MacBook Air and iPhone 6 Plus) and it immediately makes a good case for itself.

Connection is quick and easy, but more importantly the unit has a nicely balanced, clean and open sound.

Playing Beach House's latest 'Depression Cherry' collection, Victoria Legrand's haunting vocals have a realistic tone and depth to them while the duo's subtle organ sounds and gentle guitar backing are crystal clear.

While a 'speaker system this size

will never give a true stereo spread, the M-3 still manages to throw out a decent soundstage — meaning the panning effects of Pink Floyd's 'Dark Side Of The Moon' are heard to their full effect.

Low frequencies, while not cavernous, retain tone and definition and never descend into a tuneless thump. Listening to Ian Dury And The Blockheads' 'Hit Me With Your Rhythm Stick' I could track Norman Watt-Roy's sinuous bass line in all its complexity.

The solid cabinet (the whole unit weighs just over 7lb which is relatively weighty for its size) also means the M-3 doesn't rattle and shake like some when the volume is pushed hard. There's more than enough power to fill a medium-sized room, which would make it ideal as a sound source in a kitchen or bedroom.

Yes, it's operating in a crowded market. But with its luxurious styling, nicely balanced sound and ease of operation the M-3 has enough in its favour to ensure it should be near the top of your list if you are looking for a compact, wireless 'speaker system.

**GGMM
M3-FREEDOM
(WS-301) £240**



OUTSTANDING - amongst the best

VERDICT

Classy looks, solid build and top-notch sound make the M-Freedom one of the best of its breed at the price.

FOR

- design
- well-balanced sound
- ease of operation

AGAINST

- nothing at the price

Digital Audio Distribution
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www.dadaudio.co.uk



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www.exposurehifi.com

Audio Pi

Cirrus Logic recently introduced a new audio board for the Raspberry Pi educational computer. Price just £25! You can listen and record hi-res digital, so Noel Keywood did...

The Cirrus Logic audio card for the Raspberry Pi computer is, quite simply, monstrously complex in underlying structure and beyond easy description. I will keep this review short and sweet and non-technical, so you get the hang of what it can do from a high-fidelity perspective – and whether it may suit you or your son/daughter, bearing in mind Raspberry Pi is an educational computer that has sold 4 million units around the world to date – and is probably better known to those under 20 years old than those over it.

The Cirrus Logic audio card we reviewed (Version A1.01) is relatively new, taking over from a Wolfson predecessor and sent to us by element14 of the UK, who produce it, so it's recent and representative. My 15-year-old son Douglas was given the task of getting this new Raspberry Pi 2 Model B up and running since he is part of its target educational audience, knew about it and has a view. You can read his experiences and views separately here.

This tiny audio card, price £25, will play digital music files stored in Raspberry Pi's microSD card memory, using a music player bundled with the Cirrus Logic audio card drivers named LXmusic. Both analogue and digital outputs are available to drive headphones or hi-fi. We are talking about being able to play top quality, high-resolution digital audio files here (24/192): the board is a full blown hi-fi product, not just a geeky MP3

player.

But that is far from all – this little board will also record analogue audio to a digital file directly, since it possesses internal analogue-to-digital convertors (ADCs) as well – and that means it can record LP, radio or anything else – even speech. It can record digital direct too, through a normal (phono socket) electrical S/PDIF input.

And there's even more. Two on-board miniature (MEMS) microphones enable it to record stereo sound direct, and a tiny on-board Class D 1.4 Watt per channel power amplifier can drive loudspeakers. Awesome at the price!

The card has three major silicon chips on-board, the key item being a Wolfson WM5102 audio Codec (coder/decoder). It is a fiercely complicated chip designed for mobile phones, tablets, what have you. The remaining two chips are a WM8804 S/PDIF transmitter and receiver, showing that digital audio connectivity has been taken seriously, and a WM7220 digital microphone module.

The WM5102 audio codec possesses no fewer than six ADCs and seven DACs on-board, all with a respectable hi-fi specification, even though this is a mobile 'phone chip. The 24bit resolution DACs have a quoted 113dB range – better than CD's 102dB – and they met this under test. The 24bit ADCs have 96dB range.

There is a Digital Signal Processor (DSP) to handle audio manipulation, and standard sample

rates quoted are 4kHz up to 192kHz.

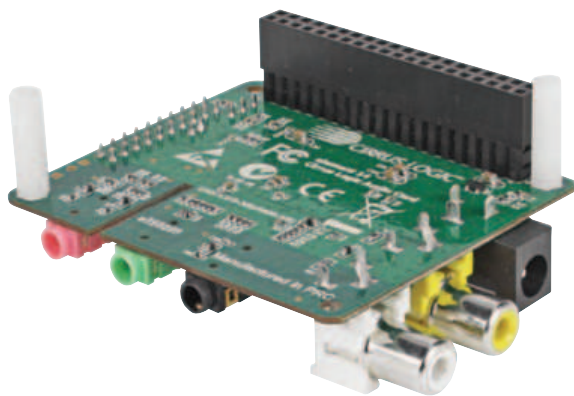
The two Class D loudspeaker power amplifiers need their own 5V, 2A power supply – if they are used. This explains the audio board's d.c. input socket. You must also solder in loudspeaker connecting pins, so some DIY is involved – plus the ability to use a small 15W soldering iron, steady hands etc!

BOARD INSTALLATION

Our board came in a small unprepossessing cardboard box, together with two support pillars and nylon attachment screws. It's multi-pin connector is a simple push fit onto a matching connector on the Raspberry Pi board. Easy and trouble free – no soldering is needed.

Software for the board, including music player and audio drivers, must be installed. This isn't quite so easy; see our accompanying article on the Raspberry Pi computer; Douglas wasn't always so happy about difficulties here! You have to be aware that you must save an image that is bootable, meaning it must be seen directly by the bios – and not a file





On the underside lies a long black connecting block that simply plugs into the Raspberry Pi board.

buried in a file tree structure.

Audio input and output sockets are all fitted: phono sockets and 3.5mm stereo jacks.

BOARD SET UP

The WM5102 uses a bus switching system known as ALSA, to route audio and change volume – explaining the need for users to programme the WM5102 chip via terminal commands made through Raspberry Pi's terminal function, LXTerminal on the desktop.

Terminal commands are, in consumer computing, Neolithic. You write in code on the screen to get the computer to do something. It isn't easy, convenient or fast, so it was dropped eons ago in favour of icons that invoke pre-written code. So these days we point at a picture or word (Save, Record etc) and the underlying code runs. But this board goes back to terminal work. It isn't the end of the world but you do need a bit of patience, a keen eye to ensure you entered Lineout and not LineOut, for example, and a list of commands either written down or stored in your head.

Terminal commands also set various parameters such as record sample rate, etc. – and this is where life gets a little taxing, since some of the commands are arcane (weirdly written) and lengthy. However, they are set-up commands used occasionally, whereas the LXmusic player that will see regular use is, thankfully, not command line driven, but works from screen icons just like iTunes etc. – easier, faster and error free.

A difficulty with LXmusic player is that if you wish to play, say, MP3 you must download an MP3 decoder

that may or may not be free (MP3 is a proprietary compression algorithm developed by the Fraunhofer Institute, Germany). Our LXmusic player only worked with stereo FLAC files by default, but we were happy to work in FLAC. It does not recognise single-channel mono files either, but these are rare so it isn't a big issue.

There is more about the audio board's file compatibility on the forums, but be aware that comments predating 2015 may not be relevant to the Rasperian OS, board software and LXmusic player reviewed here, which are the latest 2015 iterations. See especially ragnar.jensen on <http://www.element14.com/community/thread/42202//cirrus-logic-audio-card-working-on-the-raspberry-pi-2>.

A graphic set up programme called Jack comes bundled in the software to aid set up but ours would not function and wasn't needed in any case.

PROGRAMMING

Here's an example of how command line drive of the audio board works. If, for example, you need to switch audio out through the black Headset socket (3.5mm stereo jack) mounted on the board to listen to music over headphones, you must bring up LXTerminal on the monitor screen by clicking on its icon, then type in:

./Playback_to_Headset.sh

Note in particular that commands (shell scripts) are prefaced by ./ and that upper and lower cases (Capitals, non-Capitals) are recognised and

important. With command lines all characters must be correct or an error message is returned – a frustration.

Get the command right, however, and down the screen spews a long command set, including conditions that can be changed – if you know how! What you need to know here, but is lacking from the User Manual, is that the board uses an ALSA mixer and you are in fact programming this item (amixer; arecord etc) when setting up the sound card. This is important when Googling questions, as Cirrus Logic advise for seeking help in the forums.

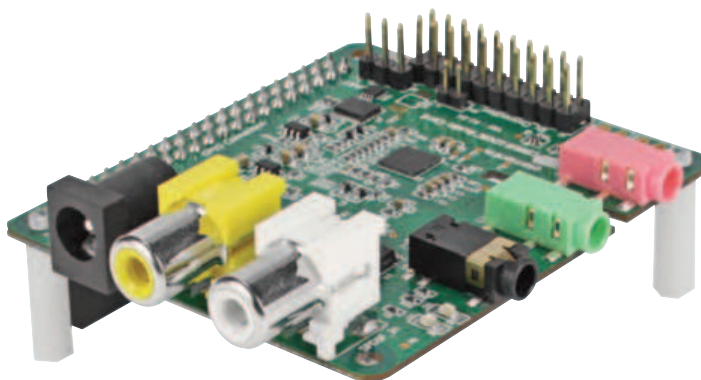
Commands are cumulative, so if you select Headset then Line Out you get both. If you want to switch one off, a Clear command must be used and new conditions re-programmed. It is tedious and taxing, but it works fine once you get the hang of it. Of course it does mean that to use the music player you must have Pi hooked up to a screen and connected to keyboard and mouse. Set-up conditions are stored and retained after switch off.

FUNCTIONALITY

What can you do with this board? Here's a list that we verified through usage. With further programming, more is likely possible.

1) Play back digital music files via headphones

It acts as a digital music player, in our case using bundled software LXmusic; other players are available. Our version of LXmusic played only stereo FLAC files, up to 24/192



The tiny board carries a rank of audio connectors. The yellow phono socket is an S/PDIF digital output, the white an S/PDIF digital input. Around the corner lies a black 3.5mm 'HeadSet' jack socket, a green analogue Line Out and a pink analogue Line In. A 5V d.c. power input socket (black) is at far left.

without any difficulty. Volume is digitally controlled by a slider (softvol).

2) Play back digital music files via Line Out.

This is a fixed level IV maximum output that will feed the hi-fi, through CD or Aux in sockets. Volume is controlled in the hi-fi.

3) Use as external DAC

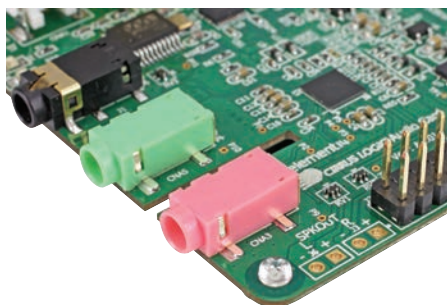
The board can act as a hi-res audio DAC. The S/PDIF input must be selected for this, alongside the Line Output and/or HeadSet output. Digital signals can be fed in from, say, a portable player. Note that there is no USB, nor an optical input.

4) Use with external DAC

If you want even better hi-res playback quality then the S/PDIF output can be selected, in order to make an electrical connection to an external DAC from, say, Audiolab, Oppo or Chord, all of whom make DACs with greater dynamic range and even better audio quality.

5) Record analogue from Line In.

The input must be selected and then the record file spec etc. It gets



Four through-plated holes, seen at front here, need either pins or wires soldered in to feed loudspeakers. The vertical gold pins are for external connection.

complicated, but works well if you have enough card space. Use Ctrl C to stop.

6) Record digital from S/PDIF in. More hanky-panky with user scripts but it works.

7) Record from on-board mics. This is a subject in itself. See the WM5102 Spec Sheet for deep detail on circuitry.

DRIVING LOUDSPEAKERS

To drive loudspeakers you need

CIRRUS LOGIC, WOLFSON ETC

Raspberry Pi is a UK initiative of the Raspberry Pi foundation based on what was once the BBC Micro – a 1980s education tool. The BBC Micro used a microprocessor running a unique RISC instruction set that has since been UK developed by ARM Cambridge into the increasingly popular ARM processor, an 'alternative' to Intel as it were, except ARM UK produce only the IP, not the chips themselves.

A subsidiary of UK electronic component supplier Farnell, known as element14, produces Pi for the Raspberry Pi foundation (it is made in China) using a Broadcom (US) ARM chip. They also produced an audio board using Wolfson (UK) chips.

Then in 2014 along came Cirrus Logic, a US electronics company, and bought Wolfson for a reported £214 million. The Wolfson audio board was then revamped to become the Cirrus Logic audio board we tested, still populated with Wolfson chips.

It's all a bit tortuous, but partly because both ARM and Raspberry Pi have both become globally important, if for different but interconnected reasons: ARM because it is small and consumes little power, Pi because it is incredibly cheap and an impressive educational tool using the latest technology.

to buy an external 5V, 2A power supply with suitable co-axial plug (5.5mm/2.1mm) with centre pole positive; Maplins have a good, smoothed supply of suitable specs and with the necessary co-axial connector. This PSU will run the whole board; the microUSB power line becomes unnecessary. To get up and running means soldering in connecting pins but we soldered in flying leads with insulated croc-clips. The loudspeaker output must also be selected by a screen command at LXTerminal.

The small Class D amps produce a mass of high frequency switching mush that varied with level and distortion values were in the order of 3-13%. Output moved into overload clipping around 3V, or 1 Watt (into 8 Ohms), so these are 1 Watt amps. A low pass output filter is recommended in the WM5102 datasheet to kill mush – see p318.

What is not said is that there is no software volume control; output is fixed! To change volume I ran the following script:

```
amixer $1 -Dhw:sndrpiwsp
cset name='Speaker Digital
Volume' 126
```

The number at the end – 126 here – sets gain / volume – hardly user friendly. A script could be recalled by using cursor Up key, then modified, to change volume quickly without a complete re-write. But the commands are arcane and tedious to apply.

These little Class Ds are crude so are best not bothered with – hence the

lack of connectors etc. LP filters will clear HF mush, but not audio-band mush.

CONCLUSION

The Cirrus Logic audio board provides excellent sound quality and has a wide range of capabilities – if you can find out how to use them. The problem here is an inconsistent User Manual that omits a lot of important information. A lot better is needed, at least on the element14 website.

Instead you are requested to plough through a lot of forum posts to reach an understanding of basic issues, and solve the problems that are inevitable. This appeals to some, but not to most.

Our Raspberry Pi and its audio board – in essence – worked well. If you have the time, patience and interest to understand how to set it up and use it, this is a superb little board at an amazingly low price. You will get great sound quality, if with some effort.

For more see...

http://www.element14.com/community/community/raspberry-pi/raspberry-pi-accessories/cirrus_logic_audio_card?

WHAT YOU NEED TO GET RASPBERRY PI GOING

Raspberry Pi board	30.00
USB 5V, 1A power supply (e.g. phone charger, etc)	15.00
USB A-microUSB power cable	8.00
Computer monitor with HDMI input	100.00
HDMI-HDMI monitor cable	15.00
Keyboard (USB)	20.00
Mouse (USB)	10.00
microSD memory card, 8GB	8.00
USB storage key (memory stick)	15.00
	£221.00
Cirrus Logic audio card	25.00
5V, 2A power supply for power amp.	20.00
	£45.00

Another computer to download software onto microSD card and/or USB key for initial set up.
Ethernet connection to internet to download software direct.

MEASURED PERFORMANCE



The Cirrus Logic audio board with loudspeaker leads soldered in and a suitable Maplins 5V, 2A smoothed power supply connected.

A major issue with this audio board is that it's very dependent upon the quality of the power supply used to drive it. A noisy 5V switch-mode power supply unit (PSU) resulted in 76dB dynamic range from Line Out, but a quiet one (Apple phone charger) gave an excellent 110dB – an improvement of 34dB gained solely by using a better power supply.

More surprisingly, this also cleaned up the digital S/PDIF output to a Chord 2Cute external DAC, allowing it deliver the full 121dB dynamic range of which it is capable.

A good supply would be a battery of some sort, lead-acid or lithium ion, for top audio results, or a smoothed linear supply, bearing in mind that 5V is needed and batteries deliver 6V. Switch-mode supplies generate rubbish and the audio card is sensitive to this (the Apple charger is switch mode, but clean). See p320 of the WM5102 datasheet for more on this.

With a full level 0dB digital playback signal the audio board gave exactly 1V out maximum from HeadSet (black socket) before overload. However, it overloads after the volume control and with a 0dB signal volume had to be reduced a long way to avoid overload and the distortion it generates. Overload such as this would be obvious on headphones and only with insensitive 'phones would more than 1V be needed so there are no issues here.

With a -60dB distortion test signal, gain (volume) could be set to maximum

and under this condition output measured 37mV, indicating the audio board needs to swing 3.7V rms to deliver full output without overload – not possible from a 5V d.c. power supply without using power line d.c. voltage converters. At full gain the board's DAC was able to deliver 0.05% distortion from a 24bit resolution signal – a surprisingly good result, up with that achieved from hi-fi converters. EIAJ Dynamic Range measured 113dB – also a very good figure, well above CD at 102dB, if not quite up with the hi-fi average of 115dB or top DACs at 122dB. It shows the board's DACs offer good results, however.

With a 192kHz sample rate file, frequency response measured flat to 56kHz (-1dB) our analysis shows, at half volume. Surprisingly, the volume control curtails this a bit at high settings, bringing the upper limit down to 20kHz, but this isn't going to be easily audible nor a real life setting. So the board exploits 192 hi-res digital well enough.

Line Out (green socket) offers a fixed output unaffected by the volume control. Maximum level has been set to 1V to avoid output overload, distortion (24bit) measuring 0.07% at -60dB and EIAJ Dynamic Range 110dB – similar results to HeadSet with volume reduced to give 1V out, so Line Out does not offer better quality, only fixed volume.

The digital S/PDIF output was connected to a Chord 2Cute DAC to see if its intrinsic 121dB dynamic range value could be exploited to achieve better quality than the board's internal DACs. Interestingly, power supply noise made a massive difference here, dynamic range improving from 106dB with a noisy PSU, to a full 121dB through the 2Cute with a good PSU. So using an external DAC connected to S/PDIF out does offer better quality than the internal DACs. However, only DACs from Chord, ESS (Sabre32 9018) and Burr Brown (PCM1765) improve on the audio board's DACs that, in themselves, offer relatively good results. The volume slider of the LXMusic player, even though it would appear to be digital, does not affect S/PDIF out.

Recording via the Line In (pink socket) showed a 1V input was needed for a full level 0dB signal as standard default. However, record gain can be increased by those with the time and inclination to delve into writing a suitable command line script. Recordings at 16/44.1kHz delivered similar quality to CD, with bandwidth to 20kHz and 92dB dynamic range. Our board would only

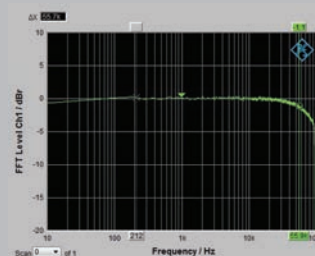
record at 16bit resolution, not 24bit and the WM5102 data sheet alludes to Normal and High Performance modes, but which mode the board uses is unstated. The ADCs are 24bit it seems from the datasheet.

The loudspeaker output delivered 3V at 3% distortion and above this output overload (clipping) set in. Frequency response reached 90kHz however, with a 192kHz sample rate signal. We did not use an output LP filter, but one is required the datasheet says (p318) to remove all the switching noise. There was no d.c. offset, differential or to ground.

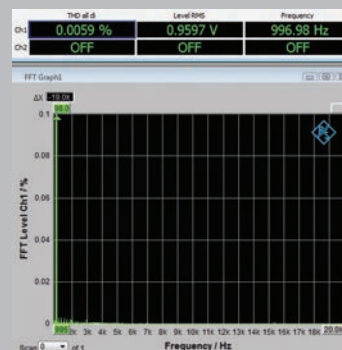
The Cirrus Logic audio board delivered very good results from its on-board DACs, reaching full hi-fi spec. The ADCs worked well too, offering CD quality. Only the small loudspeaker power amplifiers were a bit limited, but that is to be expected considering they are built into a tiny chip and an external low pass filter (22μH/3μF) is needed to clean the output. **NK**

Frequency response (-1dB)	
(192kHz)	10Hz-16kHz
Distortion	24bit
0dB	0.006%
-60dB	0.05%
Separation (1kHz)	110dB
Noise (IEC A)	110dB
Dynamic range	113dB
Output	1V

FREQUENCY RESPONSE



DISTORTION



CIRRUS LOGIC AUDIO CARD £25



OUTSTANDING - amongst the best

VALUE - keenly priced

VERDICT

A sound card for Raspberry Pi that offers excellent sound quality and can record too.

FOR

- high res digital sound
- records digitally
- on-board power amps
- very low cost

AGAINST

- poor documentation
- technically complex
- difficult to use

Element14
www.element14.com

Power of Pi

What is a Raspberry Pi? Douglas Keywood sets up this tiny £30 computer and looks at what it can do.

The Raspberry Pi is a small, low-powered, credit card sized computer that plugs into any HDMI equipped monitor and uses a regular keyboard and mouse, connected via USB. It was designed with children and coding amateurs in mind, although we are looking at what it does with audio – its entertainment functions if you like.

This aside for a moment, one of the Pi's main functions and goals is to teach children, teens and programming amateurs the basic and also more complex sides of coding and computer programming with Python, Scratch and Wolfram (which is more advanced). This makes Raspberry Pi ideal for use in schools where its prime function is to run educational software for those who are learning to code and programme, and at a price point of £29.99 the Pi is cheap enough for wide use in primary and secondary schools. It is also suitably durable too.

In essence Raspberry Pi is capable of performing the everyday functions of a standard computer, such as watching HD video, playing music and browsing the web. However, due to the fact that the most recent Pi 2 Model B's hardware isn't very powerful (despite being the most powerful Pi to date) I found that there are limitations to how the Pi can be used, such as not being able to run regular OSs' such as Windows 7 and 8. But it is able to run specially designed OSs' such as Raspbian, its own OS, a variation of Linux, as well as other Linux variants and even, at a later date, Windows 10, although probably in simplified form.

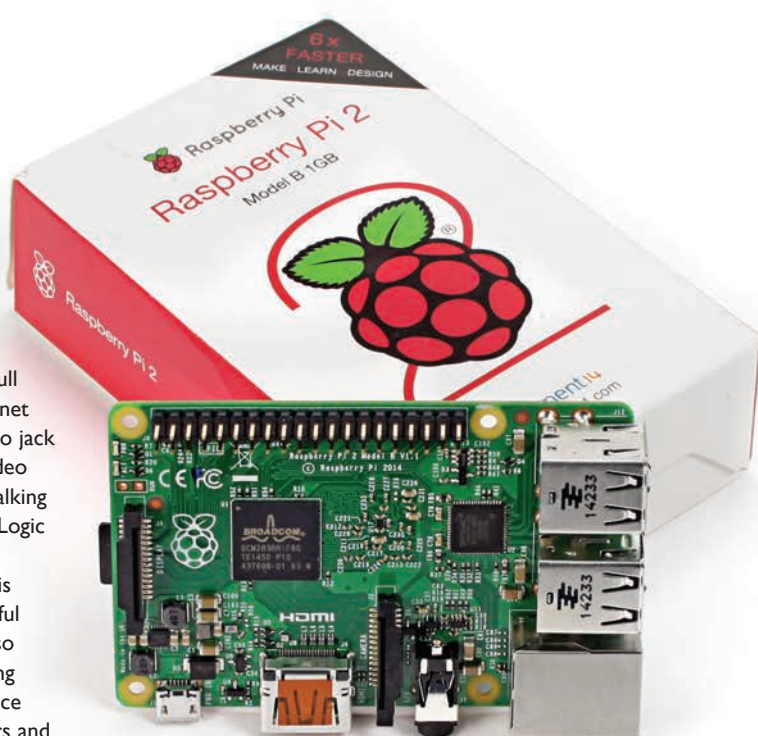
The Pi sports a 900 MHz quad-core ARM Cortex-A7 CPU with 1GB or DDR2 RAM hard wired on-board. For memory it uses a micro SD card which differs from its earlier counterparts which used regular SD

cards; note the absence of hard disc storage. The Raspberry Pi circuit board also possesses a full HDMI port, ethernet port, 3.5 mm audio jack and composite video – note I am not talking about the Cirrus Logic audio board here.

Raspberry Pi is immensely powerful for its size, but also for its price. Having previous experience building computers and a good understanding of computer hardware, I found the Pi incredibly easy to build; it could be built by even the most inept and inexperienced builder as all that is required is the plugging in of a few cables and pins. This sort-of makes the Pi ideal as a first computer for a young child or teen, as well as for larger use in schools. As a 15-year-old moving on to sixth form I could see the potential benefits of Pi in teaching computing and programming

to a generation that is largely disinterested in the subject.

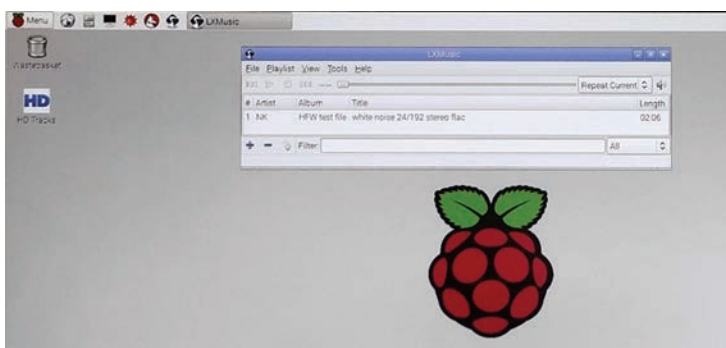
Although the Raspberry Pi OS comes with pre-installed software like Python to teach coding and programming, a 'Pi Store' offers further learning programmes at both beginner and more advanced levels. The store also offers games, development tools and apps to expand the uses of the Pi. The Pi OS also comes with its own Epiphany



Raspberry Pi uses a Broadcom ARM processor. It needs very little power so runs cool – eliminating heat sinks, noisy fans and all.

web browser and is capable of wi-fi connectivity by using a wi-fi dongle.

However, despite the fact that the Pi is impressively powerful for its size and price, it's certainly no super computer when compared to average, 'grown up' computers. The Pi's 1GB of DDR2 RAM instead of the DDR3 RAM most computers use today and the 900 MHz CPU are far slower compared to the 2.4 GHz CPU's which are the minimum speed for today's average computers. Furthermore the Pi can only run videos up to 720p resolution and I found that both the browser and the Pi itself can be quite slow at times.



The Pi screen desktop looks much like a simplified Mac or PC. It is a conventional graphical user interface, or GUI, but LXTerminal is close at hand – and needed.

As a result, I sometimes found myself becoming slightly impatient with the Pi.

In an era where everything is instant and loads at the left click of a mouse, the Pi looks tardy. But on the plus side, I found that in comparison with standard operating systems (Windows and Mac) Pi's visually simple user interface (UI) makes it easier to understand and handle by younger users.

Once you get a Pi you need to load the 'NOOBS' OS onto your chosen SD card. To learn how to do this I suggest you watch a step by step walkthrough: go to raspberrypi.org and go to the downloads section then click on NOOBS.

The Cirrus Logic audio card drivers also need to be installed after the NOOBS OS; without the drivers the card won't work.

To install the drivers you will need to visit the element14 website and find the Cirrus Logic audio card then click 'software download' and the drivers will automatically install

to your computer.

Unfortunately, you won't be able to simply copy and paste the software file over. On the same page from which you downloaded the software, there is a user manual and it has instructions on how to install the drivers to your SD card.

Once all the software is installed and the Pi is booted up you will have to go through a simple installation process and then the Pi should be ready to run.

Once you're in the Pi, navigation is fairly simple, and similar to that of a standard computer running Windows – and using applications such as those in the Pi store is easy.

CONCLUSION

Unfortunately, overall, I found at times the Pi could be frustrating and somewhat impossible.

Using the Pi requires at least a basic understanding of software and an understanding of command line drive, meaning what command line code is required, as well as typing it in without error.

Without at least an intermediate level of understanding of computers the Pi can be a frustration, despite being designed to be easy to run.

One of the most popular uses for the Pi is as a standalone music player for use anywhere where there

is a micro-USB connection, such as in the living room or the bedroom.

Firstly, however, in order to perform this function you must buy an audio card to attach to the Pi. The card I used was the Cirrus Logic audio card, which possesses a 3.5mm jack for headphone output with microphone facility, a digital stereo audio input and output, an onboard power amplifier for directly driving loudspeakers and is capable of rendering HD audio at 24-bit, 192kHz.

Music can be transported to the Pi using a USB key (memory stick), or by transferring files directly to the micro-SD card.

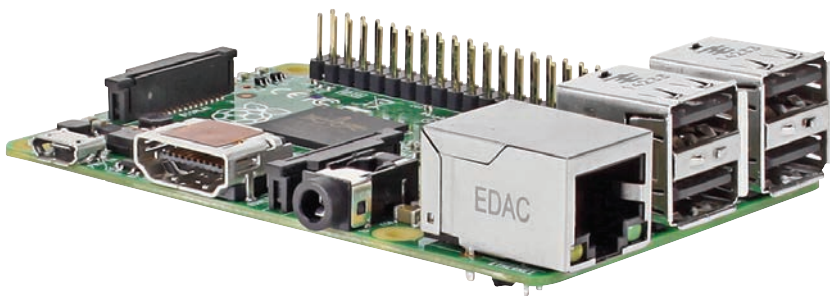
The standard Raspberry Pi OS has a default music player called LXmusic. However, I found the music player both basic and simple – and it refused to play the tracks until we fully understood, through experiment – its limited abilities.

However, other music players exist, created to enhance Raspberry Pi as a music player; the most notable being PiMusicBox and RuneAudio.

RuneAudio and PiMusicBox are free – open source software that enable you to turn the Pi into a dedicated hi-fi music player to replace the personal computer, with a smaller, low power, quiet board.

One of the main purposes of this software is to get the best possible sound quality out of the Pi by optimising the Pi for the best performance. There's plenty to experiment with, making this absorbing if you like computers.

Various external cards are available too, including audio cards – see Letters this month for a reader's experience.



The tiny Raspberry Pi board bristles with connectors. At left is an HDMI socket for a monitor screen and just right of it a small black 3.5mm headphone jack. The large block at front is an RJ45 socket for ethernet and to its right sit four USB sockets. At rear are the pins that accept the audio board's socket.

For more see...
<https://www.raspberrypi.org>
<http://www.element14.com>

Amazon and Maplins also sell Raspberry Pi, Pi kits and accessories.

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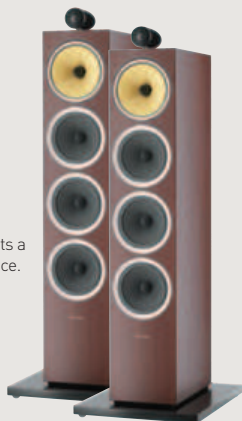
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THE LOVIN' SPOONFUL

Daydream
Sundazed

An excellent album of mostly originals from this jug band, pop, blues, rock combo. This LP is accompanied by two other, contemporary releases: 'Do You Believe In Magic' (1965) and 'Hums of The Lovin' Spoonful' (1966). The big news for all three releases is that the vinyl has been cut using the original Kama Sutra mono masters.

Listening to the band's big hit, a theme tune of sorts, 'Daydream', the first track on the album of the same name, the presentation is clear, open and airy.

John Sebastian's vocal delivery has an almost treated feel, as if he's twisting his own vocal chords, while the slowly rhythmic guitar offers a welcome band of bass.

The acoustic guitar that introduces itself a few seconds into the track is the early star on this cut. It offers an immense amount of detail, effectively revealing the metallic nature of the

strings to startling effect.

The deep soundstage adds a rounded, full, rich tone to the cosy nature of the arrangement. Yet, through all of these pleasantries and sonic highlights, playing the LP with a stereo cartridge - even though I might have been using a rather nice Koetsu Black - in mono mode (my Icon PS3 has a mono switch), the mono presentation only offers a portion of what it's truly capable of.

Switch the cartridge to a Miyajima Zero, for example, and the entire LP transforms itself from a rather thin sounding, strident presentation to a full, rich suite of upper mids and strong, hefty bass.

If you want to get the best from this and the other Loving Spoonful releases then you'll need a mono cartridge with a 0.7mil tip, which allows the tip to retain contact with all of the groove.

With such a set up, this LP will, literally, 'sing'.

AUDIOPHILE VINYL



THE MISSION

The First Chapter/God's Own Medicine/Live:
Children and Carved In Sand
Let Them Eat Vinyl

A splendid array of four live double albums from 2008, covering four consecutive dates, the 27 February to 1 March at London's Shepherd's Bush Empire. Starting with 'Tomorrow Never Knows' from 'The First Chapter' I sat back and relaxed, this was going to be fun. Why? Because the cut, for a live album, has been well constructed, in sonic terms.

Firstly, there is a satisfying bass punch that, with the right system, will shake your walls and probably the walls of the house half a mile away. The drive offered by both the percussion but also by the electric guitar, gives the whole album energy and excitement. Wayne Hussey's lead vocal performance is also intense and passionate, portraying enough emotion to drag you into his work and the concert itself.

I was also pleased to hear the

space that surrounds the entire soundstage. The reverb, combined with the air that sits on this live cut also provides a 'bigness' to the performance that fills the room.

During 'Bridges Burning' From 'God's Own Medicine', one slightly disconcerting aspect of the pressing was an intermittent noise that hinted at pressing problems. Assuming it was my own fault I re-cleaned the record but the noise remained, which is a shame.

I assume that I have a rogue copy and that the rest of the pressing batch is perfect but it might be a detail to look out for. The track was most enjoyable, though, with just enough audience participation to add atmosphere but not too much to become an irritating issue: I listen to a record to hear a band playing, not a bunch of strangers singing (I get enough of that from buskers down my High Street).

These concerts had the right balance.

King always 'did' elegance well. This 1962 release, his third album, is short on time but high in quality.

Beginning with King's big hit 'Stand By Me' I was impressed -firstly by the silence of the cut. This is one quiet cookie that allows the music and all of its attendant details to flow.

Hence, there is a delicate, regular triangle strike at the beginning of this song that is not only visible but rings with a fragile treble reverberation.

More to the point, the triangle output continues throughout the song as the music builds in power and passion, both in terms of King's presentation but also via an orchestral accompaniment.

During the entire track, as the volume level increases, there is that triangle. It never gets lost, which is a testament to the mastering of this, allowing the

instrumental separation to remain constant and to allow air to flow in between. Good quality hi-fi chains will have a ball with this track. But it doesn't end there, of course.

The sonic qualities of this cut keep on coming and keep surprising. For 'Ecstasy', both the secondary percussion and bass are pushed to the sidelines as minor players to the vocals and dominant strings. Again, though, this subtle detail is never lost to the ear.

Once more, on 'Horizon', it's the tricky piano that threatens to be subsumed by those darned strings but the master cut puts the piano in its own bubble on the left of the soundstage.

Such is the delicacy offered by this pressing, that this part of the soundstage is a joy to hear.

The album itself is a classic but the enhancements provided by the crystal clear master just add to the pleasure of listening.

BEN E. KING DON'T PLAY THAT SONG!



BEN E. KING

Don't Play That Song!
Music On Vinyl

AUDIOPHILE VINYL

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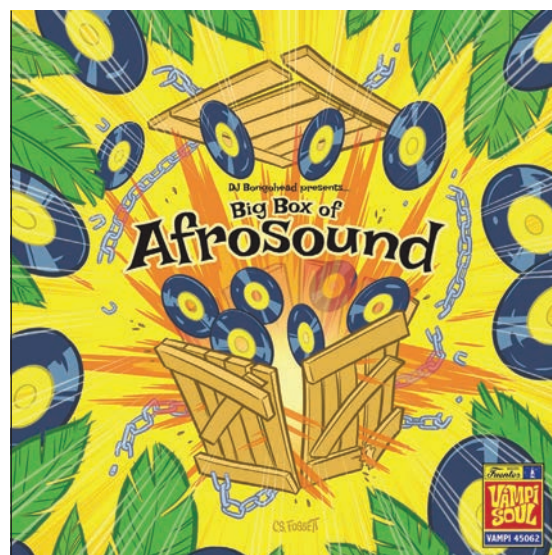
I opened this box set expecting to hear some light, rather jolly Caribbean Pina Colada froth and not much more but, spinning AfroSound's 'Calivventura' I was shocked...but in a good way. Yes, there was that hip-twirling rhythm but two things hit me. Firstly, there was a supremely playful, almost 50s TV sound-track/kitsch sound effect laden presentation that drenched the song in humour.

Next was the mighty bass that even dub fanatics will enjoy. This really needs to be played on an original Jamaican DJ sound system: the kind of King Tubby-esque construction that is packed with valves, linked to speaker cabinets with 18" cones, is tied to the ground with a chain and only fed at week-

ends on raw steak.

Even when you do get something rather lighter, such as 'Batukacuto' from Tito Duval/El Nuevo Ritmo de Roberto, there is a distinct authenticity about it. In fact I'm reminded of the British ska experiments back in the early 80s. I expected to hear Terry Hall providing the lead vocal. This track, underneath some superb brass, has as an understated old organ sound that provides excellent texture. The surprises kept on coming when I reached 'Yo Vine Pa' Goza' from Sexteo Miramar. This track offered a weird, reverb-drenched, slightly compressed harmony from voices that would have fit quite nicely into a random episode of Dr Who but sounded all the better for it. A superb, rolling, languorous beat backed by a repetitive guitar that proved hypnotic.

This set isn't so much as a compilation as a university of sound. It certainly taught me a thing or two.



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Noel Keywood

For me Tannoy's Westminster Royal GR loudspeakers bordered on worrying. They are so sonically different to other loudspeakers – but at the same time apparently the same. In fact, they are old fashioned in many respects and offer a familiar sound from way back. The big paper cones and giant wooden cabinets give a warm and fulsome balance but that just doesn't describe the way they filled our listening room and the admiration we all had for their unique properties. A lot of people got to hear them and no one left unimpressed; they're quite unlike any other loudspeaker.

The worry for me is – why? What exactly is it here that is impressive? What were we all experiencing? It certainly wasn't nostalgia; no-one commented on this aspect. And no-one commented upon the traditional appearance of the Westminsters either: their broad frontage is reminiscent of St Paul's Cathedral and just as invisible in the home. A saving grace here though is such a broad front makes a rear wall's presence irrelevant; they are a wall stander.

But none of this explains what we were hearing and feeling – and what made this speaker's sound so unique. I was aware from earlier encounters with the Westminster that it seemed to dominate a space like no other and was capable of delivering bass shock waves. Big reflex loudspeakers, meaning loudspeakers with ports, go low and produce massive subsonics but they lack the sense of grip and control of the Westminster's horns.

Big horn loudspeakers are renown for this property of course; I'm hardly the first one to be wowed by a horn. But it is worryingly different to our everyday experience

of loudspeakers – and puzzling.

When I started measuring, at the listening position, just how loud I was playing music, the result didn't tally with the power going into the speakers. The sums just didn't match the theory. Not wanting to publish figures that don't make sense, at least if you have a knowledge of acoustics, I started to investigate and soon discovered that the volume (sound pressure level) I was experiencing seated 20ft away was little different to the volume directly in front of the loudspeaker. That shouldn't be. We all know that as we walk away from something that's noisy it gets quieter, and that includes most loudspeakers – but not the Westminsters. They had the ability to drive the entire room space as if it were one. I was intrigued.

The essence of this is, I suspect, to be found outside the window as you travel to Majorca. It is all about power and giving it traction, shall I say. Travel on a jumbo jet and you'll see an engine of very large diameter outside the window. Almost impractically large in fact; modern engines barely fit under a wing and clear the ground when taxiing. A Rolls Royce Trent 900 has a nine foot diameter fan and my mind wanders to this little device when thinking about loudspeakers in the home. Large engines like this are big, cumbersome and awkward, they're monsters – but they push enormous amounts of air at low speed and there are benefits unobtainable by any other method. That's why jet engines for subsonic passenger jets have grown and grown over the years into absolute monsters. You get reduced air turbulence and – importantly – noise. They're also very efficient – just like a Westminster!

As loudspeaker drive units get bigger they produce progressively less distortion, or unwanted noise. A

typical 8in bass unit produces around 3% distortion our measurements show, whilst a 12in gets this down to 1%, and a big 15in pulls bass distortion down to 0.3% or so – about as low as you can get.

So big means better in loudspeakers as it does in jet engines – and for much the same reason: less distortion/turbulence, giving what I'd describe as peaceful power. A Westminster, when playing shockingly loud, is relaxed beyond normal experience.

The large area of the Westminster's horn mouth pushes a lot of bass power into the room at relatively low pressure. I measured this. A normal reflex port measures +6dB up in pressure relative to the bass unit cone at 80Hz, whilst the Westminsters' 'ports' were -9dB down, but they have a much larger radiating area and so were delivering higher acoustic power (pressure x surface area). Together with that huge 15in bass unit, a Westminster moves a room with relaxed ease.

My jet engine analogy strongly suggests – unfortunately – that size is everything and we can't ever expect small loudspeakers to sound like big ones. Unless someone comes up with a very bright idea that escapes me – and everyone else – at present.

But you can't rule it out. One amazing idea is that of using a fan to generate air pressure that is modulated by rapidly moving the fan blades to produce powerful subsonics. Perhaps the man that thought this up was looking out the window on the way to Majorca as well, because it harks back to my turbofan jet engine analogy again.

I am still worrying about all this. There must be some way I can get to experience the power of the Westminster in my home. I can't afford the real thing – and it would never get up the stairs! ●

A Technics SL-1200 turntable is shown with its clear dust cover removed, revealing the silver platter and tonearm. The turntable is flanked by two wooden record sleeves, each with a gold label that reads "EGR".

Every Miyajima cartridge is handcrafted in-house by a dedicated full-time team of six based in Fukuoka. The cartridge bodies are individually precision-milled from rare and exotic hardwoods including ebony, rosewood and African blackwood (mpingo). These dense natural materials lend a vibrant and natural tonality to the sound.

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"Look into the eyes of B.B.King before he even tunes up. He knows"



Paul Rigby

I have a problem with blues music. Not the genre, not the songs themselves, not the black originators or even their apprentices. I have a problem with European, white, 'blue-eyed', blues rock merchants.

That they like the music worries me not. That they play it doesn't concern me. That they purport to live the blues, understand the blues and be of the blues irritates me tremendously.

This neglected subject was heightened for me, recently, when I had a long talk with legendary Kinks vocalist and lead guitarist Dave Davies.

In 1965, the group were banned from entering the USA. Hence, The Kinks missed out on further exposure to the home of the blues – a genre, they all enjoyed.

"It had an affect on our music" Davies told me. "It internalised us and made us look more about where we lived and came from. The blues guys had their roots – we decided to look at ours and our own culture".

So while Howlin' Wolf had the Mississippi for inspiration, brother and principle song-writer Ray Davies looked towards his nearest village green. B.B. King was infused by T-Bone Walker but the Kinks were enamoured with Noel Coward.

For many Kinks contemporaries, the problem was self-indulgence. Keith Richards, Eric Clapton et al (self-absorbed, decadent, foppish, culture cuckoos of the 1960s renaissance) were living the blues experience vicariously through their blues heroes, desperately trying to compute, in a slightly bewildered fashion, how witnessing Muddy Waters painting the Chess studio's ceiling was to fit into their adopted blues angst.

Meanwhile, in their slipstream, 'axe men' like Ten Years After's

Alvin Lee, convincing Woodstock audiences to take a long trip while he selfishly satisfied himself with yawn-inducing electric guitar solos and plenty of on-stage gurning.

My own irritation on this matter was succinctly summed up by the Krautrock legend and Can percussionist Jaki Leibzeit, a fan of the blues. He would tell author, David Stubbs, in his book 'Future Days', that it would be geographically inappropriate to adopt the blues as his own, "You can only create in this tradition if you can be a part of this tradition...as a European, as a German, it's a lie to try to play pure blues".

If that's the lie. Where is the truth? You can seek it via Lightnin' Hopkins, Tampa Red, Elmore James, Howlin' Wolf, Baby Face Turner and more.

These men were part of the blues fabric. They didn't adopt the blues at the age of eighteen, their birth represented another brick in the wall of blues. The blues emanated from the pores in their skin.

Jim O'Neil wrote the notes to the excellent Ace compilation 'Tampa Red: Dynamite! The Unsung Kind of the Blues', which features rare Red productions.

His songs were regularly sung by the likes of Elmore James, B.B. King and more, but Red struggled against the system until O'Neil found him living on public assistance.

"We visited him a number of times, at his apartment, in the hospital and in the nursing home from 1973 until his death on 19 March 1981. We were able to get some royalty cheques sent to him and tried to help as we could. It just seemed the right thing to do for such a proud and dignified man who had contributed so much to the blues".

Life as a blues man or woman

was no cake walk. This was a passion, devoted to a style of music that said everything about who you were and are. Travellers on the some cultural pathway, your family, friends and any passing stranger would also know exactly where you were coming from.

Lightnin' Hopkins was another. In 1948 he sang 'Tim Moore's Farm' on the Goldstar label. The song (which can be found on Ace's 2CD 'His Blues') was about a plantation in Grimes Country, Texas.

Moore was well known for his cruelty towards his black workers (the original songwriter wished anonymity because he feared reprisals from Moore). It illustrated the plight of the black sharecropper.

Ace also has a series of blues compilations called 'The Modern Down Home Blues Sessions' from the Modern record label.

Sourced from a series of little known blues cuts, eagerly sought after by dedicated blues collectors, the Modern cuts include the recently passed B.B. King who can also be found on 'Unlock The Lock: The Kent Records Story 1958-1962' via Ace.

King, was born on a plantation to sharecropping parents. "I guess the earliest sound of blues that I can remember was in the fields while people would be pickin' cotton or choppin' or somethin'", he said.

Karaoke blues players are a dime a dozen. Some of them have achieved technical brilliance, it has to be said. Some can even make their guitars jump through hoops, flip over and play dead on their command.

But they can't play the blues for toffee. If you have the opportunity, see live archive concert footage to know why.

Look into the eyes of B.B.King before he even tunes up. He knows. Even though he probably wished he didn't. That's the difference. ●

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“this new idea could be one of the most disruptive technologies the music industry has ever seen”



Jon Myles

If you were asked 15 years ago for the names of the major players in the recorded music industry, the likelihood is your list would include the Universal, HMV, Sony, Virgin, Tower Records, BMG et al.

Ask the same question today and the roll-call will more likely include Apple, Google, Amazon, YouTube Pandora, Spotify and other digital delivery giants. That's how much the balance of power has shifted. Record companies and High Street stores used to be the traditional gatekeepers of music production, delivery and consumption, but now it is technology behemoths that dominate the business.

The chances are, though, that the name Imogen Heap wouldn't figure strongly in your thinking – despite her status as a best-selling artist in the UK and US – and the only female to have been awarded a Grammy for engineering. But this could all be about to change, in a way that might prove more disruptive to the likes of iTunes and Spotify than many people have yet imagined.

Heap is pioneering a new idea which aims to marry creativity and technology in a way she hopes will prove a boon to both established and aspiring artists, as well as ensuring more money goes to actual content creators rather than the companies which control its distribution.

If that sounds slightly utopian it's worth bearing in mind that the rise of Spotify, YouTube, Apple Music et al has led to an increasing number of complaints from artists as to exactly how much they are being paid each time one of their songs is streamed or downloaded.

Taylor Swift famously withdrew all her albums from Spotify in a

row over royalties. And when Apple announced to users it would be offering a free three-month trial of its new music streaming service – but artists wouldn't be paid for this – it was forced to quickly backtrack, such was the backlash from performers.

Central to the argument is just how much individual artists and bands get from streaming services such as Spotify and Apple Music, digital downloads from the likes of iTunes or the use of their music on videos and other content on YouTube. Spotify, for example, paid out £196 million in royalties in the first quarter of 2015 – and YouTube's bill is estimated to be around £100 million a year.

The main sticking point, however, is just how much of this money goes to the musicians actually producing the content – which is where things get difficult. Most artists will be signed to a record company and may have different deals for different territories. Add to that the fact music services pay different amounts for streaming and downloads, as well as varying fees again to songwriters via publishers – and you can soon see how difficult it is for artists to work out exactly how much they are owed.

In addition, in most cases the money will actually be paid to the record company first, who will then pass it on to the artists on their roster after taking their own cut.

All-in-all, it means making significant money from recorded music is becoming more and more difficult. Gone are the days when a multi-million selling album like 'Dark Side Of The Moon' or 'Thriller' could virtually set you up for life.

Indeed, it's been estimated that a new band signed to a record company would have to have their songs heard more than 1 million

times on a streaming service to earn something approaching the minimum wage.

So where, exactly, does Imogen Heap come into all this? Well, she's harnessing the technology known as blockchain for the release of her latest song 'Tiny Human', in an attempt to cut out the various middlemen involved in actually getting a musician's work to the consumer.

Without getting overly technical or geeky, blockchain was developed for the likes of on-line currencies such as bitcoin, but can be harnessed for other uses. Essentially it allows music and live performances to be placed on the internet by the artist, attached to contracts stipulating the terms for downloading the material and how the money will be divided up amongst those involved in its production.

The project is still very much in its early days and Heap admits the release of 'Tiny Human' is very much an experiment to see whether this model could work in the future. But if it does this new idea could be one of the most disruptive technologies the music industry has ever seen, putting a measure of control back to the music-makers, instead of the distribution of their work being in the hands of giant technology corporations.

That can only mean more artists looking to disseminate the fruits of their labour via the internet, knowing they are guaranteed a fair share of the revenue, without having to worry about exactly where the money is going or when they'll get paid.

In short, a fair, equitable and open system of music distribution that benefits both artists and consumers.

Isn't that something we can all welcome? ●

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			Quad 99 Power, excellent	used	299			Totem Rakk in mahogany, excellent	used	249
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			Tag/McLaren 60iRV, excellent boxed	used	349					
			Talk Electronics Hurricane/Tornado Pre/Power	used	Call					
			Tannoy TA1400, excellent boxed	used	599					
			TEAC Distinction A1000 Integrated, ex demo	dem	599					
			Trio L07C preamplifier good condition	used	249					
			Vincent SAV200 6 Channel monster	dem	799					
			Yamaha A-S3000, nr mint boxed	dem	1999					

"The most obvious effect of a grille is usually a slight attenuation of high frequencies"



Martin Pipe

Some like them on, some like them off. What am I talking about? Speaker grilles, of course! Two unrelated incidents have brought me to this subject. Number one was the Benchmark SMSI bookshelf speakers, reviewed elsewhere in this issue. They're supplied with solid grilles, built with a woven mesh redolent of the stuff they used to make sieves out of. They look fantastic – but these speakers sound noticeably better when they're removed.

Personally speaking, I like speakers with their grilles off – and it's not just the performance improvement that can result. Those drive units look kinda cool in my book!

The 'naked' Benchmark speakers certainly have nothing to be ashamed of. But I can understand that they're not to everyone's taste, and those exposed transducers might not 'go' with the décor of a room.

In addition, there's the risk of damage. Small children, for example, seem to take a delight in pushing in tweeter domes. For its part KEF recommends removing grilles "for serious listening", but then replacing them "following use".

I also accept that keeping the grilles on may sound better – if they were designed to work with the speakers as 'a system' in the first place, as opposed to being added as an afterthought.

The most obvious effect of a grille (especially the traditional cloth variety) is usually a slight attenuation of high frequencies. If it's removed, you might perceive the sound as being a little too 'bright'. But this might be beneficial – compensating for 'dullness' elsewhere in the reproduction chain. Once upon a time, we had tone controls to do this – but alas no more...

And that brings me to the second incident – Linn's launch of its Series 5 'speakers. These active designs are built to form part of an 'Exakt' system. Here, a player/source selector connects to the speakers via CAT-5 cable (warning: it's not Ethernet, so don't use your home network wiring!).

Across this proprietary link, control information and digital audio is sent – the latter in the same form (e.g., 44.1kHz/16-bit for CD-derived material) as the source. Analogue content like vinyl, digitised by the player/source selector, is sent in 24/192 form.

The speaker contains DSP plus DACs and power amplifiers for each drive unit. Linn's engineers are, incidentally, working on 'power DACs'. One wonders when the Holy Grail – a completely digital speaker – might follow.

This DSP primarily acts as an electronic crossover, using filtering algorithms to separate bass and treble. But it does more than this. It can compensate for the characteristics of a specific drive unit.

Secondly, phase errors and group delay can be dealt with in the digital domain. Linn's DSP also facilitates the firm's 'space correction' system. This doesn't employ a microphone to 'sound out' the room. Instead, the installer tells a piece of Windows software about the room – the size, construction, layout, materials and furnishings.

It then calculates how their effects can be countered to ensure a neutral overall sound and this corrective information is sent to the speaker's DSP.

But now, Linn is taking this one step further. An Exakt system – specifically, one built around the new 520 or 530 speakers – can compensate for the effects of a speaker grille.

Actually, 'grille' is probably the wrong word. The new speakers have what are best described as 'stockings'. Available in a wide variety of colours and patterns, they slip over the top and work their way down. They feature 'rings' that tension the fabric over the drive units thereby preventing it from vibrating in time with the music.

A zip fastener is closed to effect the tensioning, and a top 'cap' then fitted to finish the job. If you attend a demonstration, though, look out for a little tag before the stocking is zipped up. On it, you'll find a unique code that is entered into the Linn software during installation.

The specific fabric, and its effects on the sound, are thus identified and the Exakt DSP can be told to apply the necessary correction. The system does seem to work, and those who are worried that the sight of drive units will clash with their furnishings now have a practical solution.

On a different note, as I write these words, the Proms season has drawn to a close – and a fine season it has been, with some excellent performances.

I certainly enjoyed my visit to the Royal Albert Hall, which resulted in last month's feature. The team was particularly keen to promote the BBC's experimental 4.0 (i.e. quadraphonic) 'surround sound' service which was available as an online 320kbps stream.

To access the 4.0 stream, you had to visit a webpage that incorporated an embedded player. These streams were broadcast live with no iPlayer-type catch-up service. A PC with multichannel soundcard, or HDMI output, was needed to drive a multichannel audio system.

I hope that iPlayer is updated to support surround or that other means of transmitting these streams can be found. ●

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Dynamic Digital

Jon Myles tries out two new digital cables from Scottish manufacturer Atlas.



Do digital cables make a difference? It's a contentious subject and one which provokes no end of arguments in both print and via on-line forums.

On the one side some people argue that as the cable is purely handling a stream of digital 1s and 0s the construction matters very little. On the other there's the fact that terminations, screening and materials can all affect the integrity of the signal, one mechanism being jitter.

Personally, I'm in the latter camp – and having used a variety of digital cables with various components can attest to the sound quality, especially when paired with high-resolution components.

Which brings us to these two new S/PDIF coaxial cables from respected Scottish manufacturer Atlas – the Ascent Ultra at £175 and Mavros Ultra priced at £260 (one metre lengths).

Both feature the company's new Ultra plug, said to have 57 per cent reduction in mass over its predecessor. It employs a non-conductive sleeve matched to the dielectric properties of the cable, as well as utilising solder free

construction and self-cleaning insertion.

Both feature a stabilised 75Ohm impedance characteristic to help eliminate jitter, while the Mavros Ultra has a microporous PTFE dielectric with silver-plated copper conductors, compared to the Ascent's OFC copper.

In true Atlas fashion, both cables are extremely robust and well-constructed, being sturdy enough to handle repeated connection/disconnection yet with sufficient flexibility to be easily used in tight spaces.

SOUND QUALITY

Plugged in between an Oppo BDP-105D universal disc player and the outstanding Chord 2Qute DAC there was an immediate difference between the Atlas cables and a standard (£60) digital interconnect.

With the Ascent first, music had a tighter, more focussed quality to it, with a distinct lack of smear. TV On The Radio's 'Seeds' dug deeper than previously, with more drive and detail to the overall sound.

Switching to the Mavros Ultra the same qualities were evident, but with even more presence.

On Keith Jarrett's 'Paris Concert' there was an overall smoothness and unimpeded flow to the piano that seemed refreshingly free of any digital artefacts. Detail was also improved – as though the cable was removing a layer of smear from the music.

Yes, the Ascent was good – but the Mavros seemed to take things to an even more impressive level with a heightened weight and body to the low notes and greater clarity to the treble. Considering how good the Oppo/Chord combination was previously, that's a significant achievement.

CONCLUSION

These two cables really do have the ability to improve the quality of digital replay. Of the two I'd definitely recommend the Mavros if your funds and system are up to it. But the Ascent will also bring significant benefits, adding extra detail and dynamism.

Yes, some people may balk at paying over £150 for a digital cable but when you hear what they can do in a good system then objections will soon be set aside. As such both come highly recommended.

ATLAS ASCENT ULTRA £175 (1 METRE)



OUTSTANDING - amongst the best.

VALUE - keenly priced

VERDICT

An excellent digital cable that brings improved texture and clarity to music.

FOR

- detail
- clarity
- construction

AGAINST

- nothing at the price

ATLAS MAVROS ULTRA £260 (1 METRE)



OUTSTANDING - amongst the best.

VERDICT

Smooth, detailed sound that brings sophistication to digital replay.

FOR

- frequency extension
- improved treble
- smoothness

AGAINST

- not cheap

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Go Deeper





Sleek design allied to a truly different sound make Eclipse's TD-M1 desktop wireless loudspeaker system a potent proposition, says Jon Myles.

Total Eclipse

Wireless desktop loudspeaker packages come in all shapes and sizes these days – but none are quite as distinctive as the Eclipse TD-M1. The Japanese company (they're a subsidiary of Fujitsu) has a rigorously individual approach to 'speaker design – as those who have heard their larger models will know.

Central to the concept is the use of a single driver to cover the entire frequency range, avoiding the complications of trying to marry the different phase and distortion characteristics of multiple transducers together – and also giving the advantage of doing away with the need for a crossover.

However, attempting to get

one cone to adequately cover everything from the lowest to the highest audible frequencies is no easy matter – which is exactly why it's not something many manufacturers attempt.

But Eclipse is convinced it gives a more natural, musically-involving sound and has invested a great deal of engineering expertise in getting the idea to work – from the shape of the cabinet to the mounting of the single driver.

Hence the TD-M1's distinctive ovoid appearance which looks more like a scaled-down jet engine cowling than a loudspeaker with one low-mass 8cm woven-fibre driver on the front and a small port on the rear. The driver is similar to the one used on Eclipse's TD508MK3 model

except with an extra 1mm of travel – which doesn't sound very much but according to the designers makes a huge amount of difference to the bass response.

The egg-shaped cabinet means it is both extremely rigid and devoid of parallel surfaces to minimise internal standing waves which can effect stereo imaging. Unwanted vibrations are further tackled by the mounting of the driver which, instead of being affixed to a baffle, is actually connected to a heavy steel anchor which is suspended from the 'speaker housing by three damped bearings.

This whole assembly sits on a sturdy alloy strut which also includes a clever tilt mechanism which allows the 'speaker to be angled by up to 20 degrees.

ortofon

accuracy in sound



Q

uintet

Since 1948 Ortofon have introduced nearly 100 different moving coil pick-up cartridges to the hi-fi market. Their latest models in this long and proud heritage are the Quintet Series.

All Quintet cartridges use the same ABS thermoplastic bodies and neodymium magnets, but each model in the range has its own sonic expression that reflects its status. From the well-rounded **Quintet Red**, through the smooth **Quintet Blue** and spacious yet dynamic **Quintet Bronze** up to the pure audio excellence of the **Quintet Black**, this series offers something for every discerning listener at a very attractive price.

The Quintet Series also includes a true-mono cartridge, for accurate reproduction of older mono recordings.



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But if all that sounds a little unusual, the innovations don't stop there. This is the first pair of active wireless loudspeakers from the Eclipse stable and the company has also gone down a slightly different path with the electronics. Decoding duties are carried out by a 24bit/192kHz capable Wolfson WM8741 DAC - but Eclipse has adapted the chip to allow it to be used in its standard up-sampling mode or with no over-sampling employed (more of which later).

Power comes from a 20 Watt digital amplifier while an Apple AirPlay module (housed in its own damped chamber) allows direct playback from idevices. All the electronics are contained in the right-hand 'speaker' which daisy-chains to its partner via a supplied 1.5 metre cable.

Apart from wireless, other connection options include a 24/192kHz USB B input, USB A for Apple devices and a 3.5mm auxiliary analogue socket. The only noticeable omission is the lack of Bluetooth.

SET-UP

Getting the TD-M1s running is a relatively straightforward affair. Plug the master speaker in, connect it to its partner and you are good to go. There's two wireless connection modes - direct from AirPlay or via your own network - while wired connection via the USB B inputs is the normal process on a Mac, with Windows users having to download the required drivers as usual.

Volume and source selection can be controlled from touch sensitive buttons on the base of the master 'speaker' and there's also a free iOS/Android app available for those wanting remote control.

SOUND QUALITY

Anyone used to traditional multi-driver box loudspeakers might take a little time to get accustomed to the Eclipses. On paper, a single 8cm driver and just 20 Watts of power might not seem overly impressive - but that would be missing the point of this system.

Sited on either side of a normal-sized desk and toed into towards the listening position the TD-M1s have a soundstage and sense of life which is streets ahead of similar products.

Eclipse quote a frequency response of 70Hz to 30kHz (see Measured Performance for full details) but so open and coherent



The master speaker (left in the photograph) has USB A and B inputs, a wireless aerial and connects to the slave loudspeaker via a supplied 1.5 metre lead.

is the sound you rarely miss the absence of the lowest octaves.

Playing Massive Attack's 'Angel' there was a solidity to the sound but also a detail and texture that is exceptionally refined. Images seemed to float in the air in front of my face in a way most conventional loudspeakers just cannot manage. Voices, in particular, are beautifully rendered - the exquisite phrasing, nuance and emotion of Billie Holiday's delivery on the haunting 'Strange Fruit' being laid bare before me.

In some ways it's akin to listening to a truly great pair of open-backed earphones where you suddenly realise the limitations crossovers, box cabinets and more than one driver can impose. Instead the Eclipses sound completely effortless in their delivery.

Switching between oversampling

and non-oversampling modes also proved interesting - with the latter sounding slightly warmer and a touch more fuller while the former had a touch more detail. This really will be a matter of individual choice and it's nice to have the option.

Yes, in ultimate terms the TD-M1 package might not suit heavy dub or dance fans who crave absolute bass extension - but most other listeners will find them a captivating experience.

CONCLUSION

At a penny under £1000 the TD-M1 isn't the cheapest desktop system you can buy - but in a world of me-too components it is something genuinely different both in terms of looks and sound quality. If you like what it does, you'll be hard-pressed to find anything that comes anywhere close at the price.

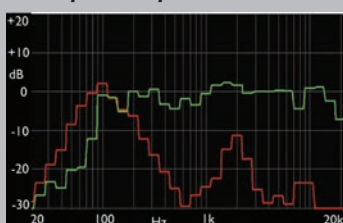
MEASURED PERFORMANCE

Frequency response of the TD-M1 measured reasonably flat across the audio band, our analysis shows, but

FREQUENCY RESPONSE

Green - driver output

Red - port output



there is a plateau drop in output below 1kHz that will give a lean balance; the M1 will not sound warm. Bass rolls off sharply below 100Hz, as expected from such a small enclosure. The port (red trace) contributes here and provides slightly lower bass extension, to 60Hz. All-in-all this is a good result, showing the speaker is reasonably accurate, keeping all frequencies in balance, but the sound will be a tad bass light and lacking in warmth or body. However, the other side of this is that the TD-M1 will sound precise and detailed - and it has smooth treble. **NK**

ECLIPSE TD-M1 £999



OUTSTANDING - amongst the best

VERDICT

A genuinely different desktop wireless 'speaker' package that has a truly beguiling sound. Top-notch build quality only adds to its charm.

FOR

- holographic soundstage
- supremely detailed
- excellent pace and timing

AGAINST

- lacks low bass
- no Bluetooth

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vinyl section

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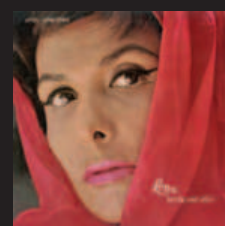
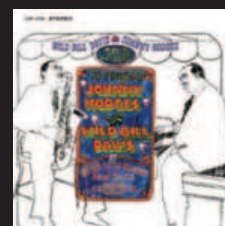
ROKSAN PUG TONEARM 82

Paul Rigby tries out the latest tonearm from specialists Roksan

news

THIRTY TIGERS

From Thirty Tigers (www.thirtytigers.com), 'Watkins Family Hour' is a self-titled LP centring around Nickel Creek sibling members Sara Watkins (violin, vocals) and Sean Watkins (guitar, vocals) and featuring a mixture of classic country, folk, rock and more. This LP includes keyboard player Benmont Tench, drummer Don Heffington, pedal steel player Greg Leisz, backing vocalist Fiona Apple and bassist Sebastian Steinberg. The group delicately recreate a range of classic from the likes of Bob Dylan and The Grateful Dead.



SPEAKERS CORNER

German audiophile label Speakers Corner (www.speakerscornerrecords.com) has a selection of new releases out and about including Wild Bill Davies & Johnny Hodges' 'In Atlantic City' (1966) - two friends who playfully encourage each other to new heights.

Also look out for Lena Horne's 'Lovely And Alive' (1962) and Hubert Laws' 'Afro-Classic', which seamlessly melds jazz, classic and pop into one enjoyable creation.

Jason Isbell's beautifully presented 'Something More than Free' comes in a gatefold sleeve. It's a calm, confident record. Even the big moments sound laid-back and relaxed with Isbell's soulful and rough delivery.

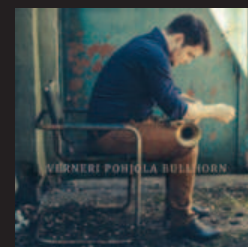
Finally 'The Bros. Landreth' isn't anything to do with Sonny Landreth the electric blues guitarist but siblings Joey and David who create a sort of Canadian version of the Allman Brothers and southern rock. It has a roots-like aura.

MOV GROOVES GROOVE

From Music on Vinyl (www.musiconvinyl.com) and starting with the superb 'Winelight' (1980) from Grover Washington - this rhythm & jazz LP is one of his best.

Eddie Floyd's 'Knock On Wood' (1967) was the soul man's debut and features the album title hit.

Another soul man, Wilson Pickett, is the subject of 'In Philadelphia' (1970). His eleventh studio album, Pickett worked with Gamble & Huff to produce an excellent, if short, LP



LIMITED EDITION

Two jazz LPs from Edition Records (www.editionrecords.com) include Phronesis' live album 'Life To Everything' a Scandi-Brit highly kinetic performance that bristles.

Also trumpet man Verner Pohjola's 'Bullhorn' is varied and strong. He's not afraid to give it everything he's got either.

JOY DIVISION

Two classics from Rhino, from this much missed combo includes 'Closer' (1980) and 'Unknown Pleasures' (1979). Pressed on 180gm vinyl and cut from the 2007 masters, these are the sum total of the band's studio ventures. Both are classics.



MUNSTER

Laghuona were an important part of Peru's psychedelic/prog rock scene during the late '60s and early '70s. 'Etcetera' (Vinilissimo; munster-records.com) draws upon The Beatles' late career style.

Erizonte's 'Los Caprichos de Goya' is a classical arrangement of avant-garde electronic music.



ESCAPE!

A classic soundtrack, scored by John Carpenter, 'Escape From New York' (Silva Screen; www.silvascreen.com) is a new 2LP set within a gatefold sleeve. It includes previously unreleased music and dialogue highlights and has been remixed and remastered from the original multi-tracks.



...AND FINALLY

Blind blues and soul man Clarence Carter appears on 'Patches' (1970; Pure Pleasure; www.purepleasurerecords.com), a classic and ideal for any fan of Muscle Shoals productions.

More experimental music from Hauschka and '2.11.14', live in Yufuin, Japan 20 November 2014 (City Slang; www.cityslang.com). Two twenty minute improvisations.

Kankakee & El Tigre's 'Quema Quema Quema' (Strut; www.strut-records.com) is a loosely formed mixture of languorous, rolling folk and rock from this Peruvian collective offering appealing melodies.

Scots-based blues outfit King King's second album 'Reaching for the Light' (Manhattan; www.manhattanrecords.com) introduces heavy rock elements.

New from Bruce Brubaker is 'Glass Piano' (InFine; http://www.infine-music.com) using Philip Glass compositions, Brubaker achieves exquisite moments of fragility and delicacy combining joyous melodic layering.

Featuring Fiddler's Dram/Oysterband/Fairport Convention vocalist Cathy LeSurr, Dave Swarbrick and Gordon Giltrap, Wolfscote's 'Turn The Glass' (Plains; wolfscote.bandcamp.com) offers sophisticated and surprising arrangements of traditional songs.

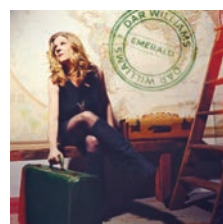
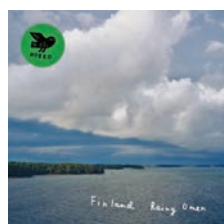
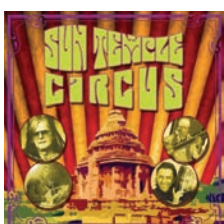
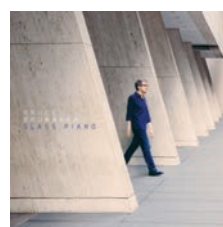
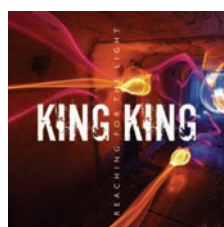
From Joanne Shaw Taylor, modern blues singer and electric guitarist, comes 'Feels Like Home: Live With The BBC Big Band' (www.bigbandspecial.co.uk). Only three tracks but a useful introduction.

Sun Temple Circus's self-titled LP (Sireena www.sireena.de) looks towards the US East Coast for musical inspiration while draping it with psychedelic overtones. From the same label is Nattefrost's 'Futurized', an electronica-fest that oozes Tangerine Dream or Klaus Schulze. Rich vintage synth sounds brings seventies comfort.

From Hubro (www.hubromusic.com) is Rainy Omen's 'Finland'. Combining instrumental avant-rock, deliberate, thoughtful guitar structures and careful arrangement music, this LP is a joy to listen to.

Dar Williams' 'Emerald' offers a stripped country/folk album that focuses on William's textured, slightly husky delivery. Often emotionally charged, Williams provides songs of depth and subtlety.

Finally, Feufollet's 'Two Universes' (Feufollet; www.feufollet.net) has an Americana (i.e. folk rock, Cajun, honky-tonk combined) feel. As if they walk around with folkish tradition spilling from their pockets.



Pug and play

Created to fill a mid-price gap, Paul Rigby reviews Roksan's new turntable arm, The Pug.



For now, the new unipivot Pug arm replaces the long-standing Tabriz, because, said Roksan boss Tufan Hashemi, "The original Tabriz arm tube had around twenty-four different processes in its manufacture. Today, with the

C-in-C machines that we have and the programming we can perform on it, I can get a much lighter and stiffer and better machined tonearm and headshell, in one piece simply by machining and drilling it out. This was impossible twenty years ago".

The basis of the Pug is...The Wand? It does resemble this arm to some degree don't you think? What I was going to say was that the carbon fibre tube forms the basis of the Pug, offering greater rigidity and a more pleasing finish than a similar aluminium tube.

Sitting on a Tungsten-Carbide, three-point bearing, featuring an aluminium headshell and a polished brass yoke, the Pug allows you to tweak to your heart's content. You can easily change VTA, azimuth and more. The counterweight utilises a range of screw-in weights plus rings for fine tuning. A moveable 'doughnut' weight was rejected because, "It would look ugly! I wanted a compact, tight arm. Nothing should move". Ah, yes. Aesthetics. On that subject, The Pug is hardly Venus incarnate is it?

"That's why I called it The Pug!" laughed Hashemi. "The real Pug is a

lovely dog, ugly but endearing. The more I look at this arm, the more I fall in love with it. It's a chunky little thing that plays music well".

This review sample is beta-esque as a package. It includes an early manual (to be re-designed) accessible by USB only (an A5 paper version is under consideration), an installation tool (that may now be removed and changed) and a basic lead (to be upgraded) plus a simple tracking weight gauge and – of all things – a Roksan key-ring.

Installation from the rather cute box (Porsche-designed!) was straightforward, while tweaking (i.e. VTA, etc) was easily implemented.

SOUND QUALITY

I began with Bruce Brubaker's solo piano piece via his 'Glass Piano' LP and the Philip Glass composition, 'Mad Rush'. Immediately, the Pug offered tremendous focus. When piano keys were hit, there was a great emphasis on the strike. This added a solidity during the initial delicate early moments of the track and prevented extraneous frequencies from blurring the upper mids.

The latter was most impressive



The screw-threaded counterweight arrives in two sizes and can be supplemented with weight-rings to match any cartridge.

**REFERENCE SYSTEM**

Wilson Benesch Full Circle turntable
 0.5 carbon fibre arm
 Oyaide platter mat
 Ortofon Cadenza Bronze cartridge
 Icon Audio PS3 Phono amplifier
 Aesthetix Calypso pre-amp
 Icon MB845 Mk.II monoblocks
 Quad ESL-57 One Thing modified speakers
 Tellurium Q speaker/phono cables
 Vertex AQ mains cables and power blocks

during the first crescendo that featured hard-hit keys and a trilling, multifarious series of keyboard runs that could have easily have added a blooming cloud of both treble and midrange. The Pug was having none of that. The focus produced space and air that gave the broad soundstage a grandiose feel – and one of great presence. That is, Brubaker sounded as if he was in the height of concentration, giving his all for this one performance. The notational separation, how each struck piano key produced a distinct, well-defined response and was impressive.

During the repeated crescendos, there were secondary, almost random, clanks and bangs as Brubaker gave his all. These fripperies were both clear and tightly formed by the Pug, producing an almost chiming effect at times.

I then moved onto harder rock from 1971 and the Electric Light Orchestra with 'First Movement'. This track was notable for featuring two principle stars: the Spanish-type acoustic guitar that initiated the track and also served as the 'lead vocal' throughout, plus the bass-ridden cellos that acted as bully-boy heavies,

bossing the presentation.

The instrumental separation of this arm allowed each to take a star role, along with the rest of the well-defined instruments – over a broad and busy soundstage. The cellos were meaty, hefty yet individual string twangs were not neglected or recessed. Far from it, any tiny mistake was tracked well while the guitar was detailed, characterful and exhibited a high degree of clarity.

Percussion was big, bold and forceful and pushed the track onwards with gusto, while the overall mastering was not neglected by The Pug.

This track was recorded back in 1971 and The Pug managed to retain and project a golden, early-70s valve-drenched glow that gave the music that distinct, period charm.

CONCLUSION

Easy to install and eminently tweakable, The Pug might not be the most aesthetically pleasing design in terms of competing turntable arms and I do have an issue with the lack of a secure arm rest - which can cause accidents if you're not careful. But, where it counts, in terms of



The Pug is highly flexible in terms of adjustment. Ideal for any audiophile 'tweaker'.

sheer sound quality, this arm is a winner. The sense of sharp, clear and well-defined midrange tones prevents information being lost in the blur.

The Pug allows music to convey a wealth of information and it does so with some power and propulsion. As such, the Pug demands your attention and, of course, a demo.

ROKSAN THE PUG ARM £1,375

OUTSTANDING - amongst the best.

VERDICT

'Pug'nacious lower frequencies combine with well-defined upper mids and treble provide an excellent overall performance.

FOR

- focus
- bass impact
- transparency
- airy mids

AGAINST

- no secure arm rest

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"...Very easy to solder...
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well made and excellent
value for money."

Neville Roberts,
Hi-Fi Choice,
September 2014

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"...the Silvers offer similarly excellent imaging, but seem to
offer improved clarity and transparency to the sound. The
Pure Harmonys appear to take this improvement a stage
further by opening up the sound stage. Bass drums also
have better attack."

Neville Roberts,
Hi-Fi Choice,
December 2014

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The Sound Spiral

A blow-up surround sound venue featuring more speakers than you can shake a stick at...Paul Rigby gets to grips with the Sound Spiral

It's a 12m long, 6m wide inflatable tunnel that can hold up to seventy-five people with a 3.5m space to the ceiling.

It's built as a series of ribs along its length with six speakers per rib: a pair right above your head, another pair to the left and right of your head and another pair left and right around waist level. That's forty-eight main speakers that are patterned in a helix shape (to remove standing

Paralympics events.

The idea was to show that this festival was more than sport, it was about bringing people together to celebrate the Olympic ideals and the arts in general.

After gaining £85,000 in funding (£35,000 of that devoted to a specially commissioned sound work to accompany it), Daz set to work, creating the nuts and bolts from a series of CAD drawings and CGI models.

The rig itself was made by Cameron's Balloons in Bristol, the largest supplier of hot air balloons in Europe, using a mixture of nylon and the thick PVC you normally see billowing on the sides of large lorries. As for the speakers? "In 1999, Videologic released the Sirocco 4.1 surround sound speakers for home and computer use. We used the original design sourced from Mark Hudson who currently designs for Wharfedale, JBL and Eminence".

And, I must add he is also a physicist who has worked in satellite and military technologies.

"Hudson had left-over stock that he supplied to us. We designed mountings that enabled them to be fitted into the walls on Velcro. We then worked with Mark on a combination software crossover design called Reaper which is similar to Pro-Tools, an output stage plus new subwoofers, created from scratch".

This was all very new, at the time, because there was no software available to control anything more than 10.2 as a true surround commercial environment.

So what does the Sound Spiral sound like? It's pretty clean, but not overly transparent because of the nature of the low-cost individual speakers installed. The sound is driving but not aggressive. It's not overly bright or barky but it is authoritative. Given the size of the speakers, it's remarkably immersive.

"The whole thing is addressable as a single mixing surface" said Daz. "Hence, I can take sound and direct



The Sound Spiral is a 12m long, 6m wide inflatable tunnel.



The construction is built as a series of ribs along its length with six speakers per rib.

it to different parts of the speaker system and tell it to move in any direction. I can take twenty different channels, mix them into twenty different positions and move them how I wish".

The Sound Spiral has been used for a gamut of projects.

"One involved a community project based around voices in a geographical area, another music artist has created a piece to help spin sound around and in multiple directions, we've had a prog rock violinist creating a piece about Ada Lovelace, Byron's daughter and Babbage's programmer, one guy used the system as a proxy for a train tunnel so we had mainline trains screaming through the space, kids workshops to create virtual desert islands, we've even mapped a town into the space using the recordings from 350 different children. There are no rules for the Sound Spiral".

If you want to know more, contact Daz at daz@dazdisley.co.uk.

The Sound Spiral idea was created by blind, renowned sound artist, Amie Slavin (left).

waves) throughout the space. There's also four subwoofers. In effect, we offer 48.4 surround sound".

That's freelance artist and programmer within the arts Daz's description of his innovative Sound Spiral space...

The initial idea came from Amie Slavin a blind, renowned sound artist who, in 2009, was commissioned by the Arts Council to create a venture for both the Olympics and

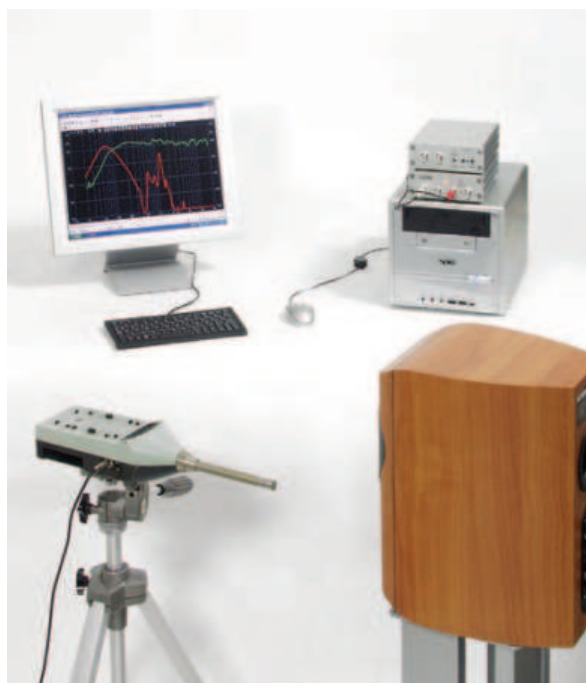


Daz set to work on the Sound Spiral, creating the nuts and bolts from a series of CAD drawings and CGI models.

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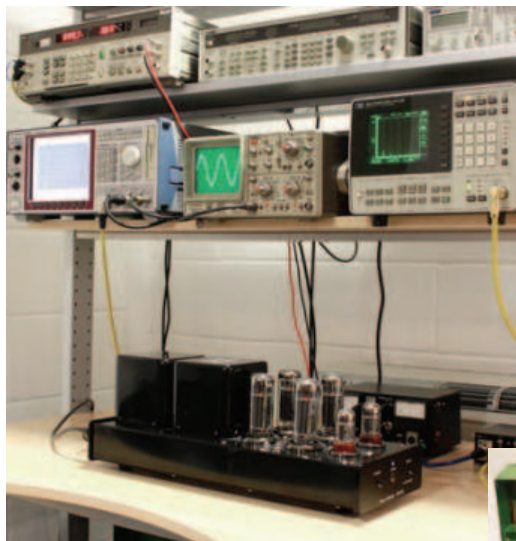
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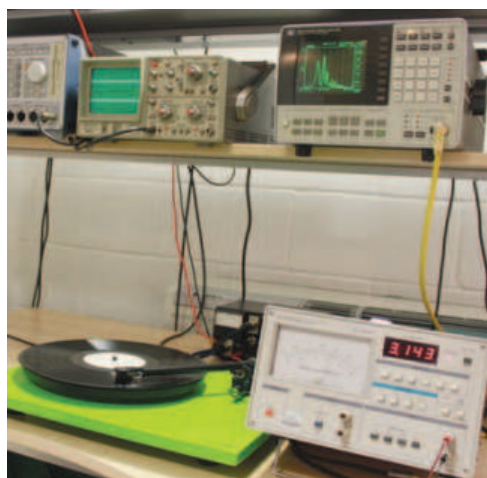
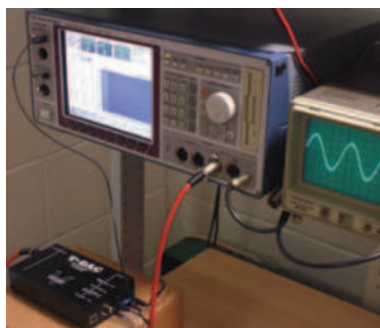
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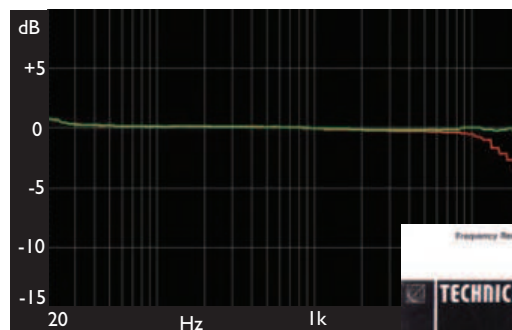
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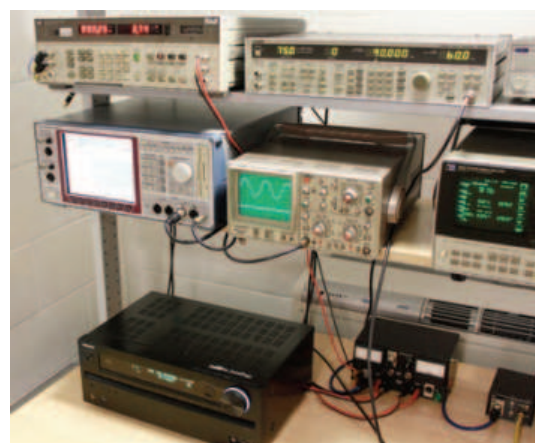
TURNTABLES

Analysing turntable speed stability is thorny. We have just bought a Kenwood 180FL Wow & Flutter meter to get a high resolution analysis from its frequency demodulated speed stability output, important to see what Direct Drives are really doing.



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Discrete decision

Quadraphonic radio was tried and with the latest analogue technology vinyl records were able to offer four discrete channels. This was the mid-70s and quad's 'high point'

Stereo radio broadcasting was becoming big business in the early 1970s, but could it stretch to the new world of quadraphonics?

The first experimental approach, tried in the US and by the BBC, was the use of separate stereo transmitters to independently carry the rear and front pairs. Listeners needed to set up two receivers or tuner-amp combinations specifically for the broadcast, but were rewarded with truly discrete (i.e. '4:4:4') four-channel sound.

One such broadcast, a 1976 L.A. Express jazz-pop concert, was a joint effort between Texas FM stations. Prior to that – in July 1974 – quad test transmissions were made by the BBC with simultaneous late-night use of the Radio 2 and 3 networks. Some discrete four-channel broadcasting experiments, using a single transmitter and various combinations of additional subcarrier to deliver the surround information, were carried out in the US and Japan. They came to nought.

A key advantage of matrix systems is that they could be

conveyed by other stereo media. In the US, some broadcasters – a well-known example being Oregon-based rock station KQIV, with its 'Rockin' in Quad' slogan – were broadcasting matrix quad. Generally, the materiel was matrix encoded and played out on a station's existing stereo gear. But the quadraphony of matrix-encoded LPs could also be carried intact. It would thus be relatively-cheap for an aspiring radio station to 'go quad'.

In the UK broadcasters like Manchester's Piccadilly, Radio Clyde and Capital in London carried out matrix-quadraphonic trials. The BBC even developed its own Matrix-H format and deployed it over a "year-long experiment" that kicked off in April 1977.

The BBC's quad material included Proms coverage, Radio 1's In Concert and a production of Shakespeare's The Tempest. But by the late 1970s Matrix-H had disappeared, while across the pond many US broadcasters had dropped quad. Conversely, the BBC remains loyal to quad in the current digital age. It carried every concert of the 2015 Proms season in '4.0 surround sound' using proprietary streaming technology.

Logic technologies may have improved matrix ('4:2:4') systems, but the result was still no substitute for discrete quadraphonics – the 'real deal'. And, thanks to the efforts of JVC, the first and most successful of these was the sophisticated CD-4 (Compatible Discrete 4-channel) system, which was also known as 'Quadradisc'. Following development work by RCA and JVC in 1972, it was introduced commercially in 1972. Mixes (sums) of the front and rear channels were used

A JVC advert from the 1970s for its CD-4 discrete four-channel system.

to modulate the inner groove walls, so that they would yield good results with stereo and mono equipment. The clever bit was to frequency-modulate supersonic 30kHz carriers with the extra quad-specific information, and mix them with the relevant stereo channel at the cutting head.

This quad-specific information was carried via 'difference' signals; a similar process underpins the Zenith-GE analogue FM stereo broadcasting system that was an obvious influence on JVC's engineers. The left difference signal consisted of the rear-left channel, minus the rear-right (thus the term 'difference'). Meanwhile, the right difference signal contained the front-right minus the rear-right.

Difference signals were carried at a low level to minimise any audible



A device such as JVC's popular 4DD5 demodulator was needed to extract the quadraphonic information from the CD-4 discs.



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Oregon-based radio station KQIV coined the slogan 'Rockin' In Quad' for its quadrasonic broadcasts.

effect on stereo listening. To counter the reduction in signal-to-noise ratio, the difference signals were treated with JVC's proprietary ANRS noise-reduction system. So that it could all be crammed in, the four channels of a CD-4 disc had to be restricted to a 'high' of 15kHz. They lacked the absolute top-end sparkle of a good stereo disc as a result.

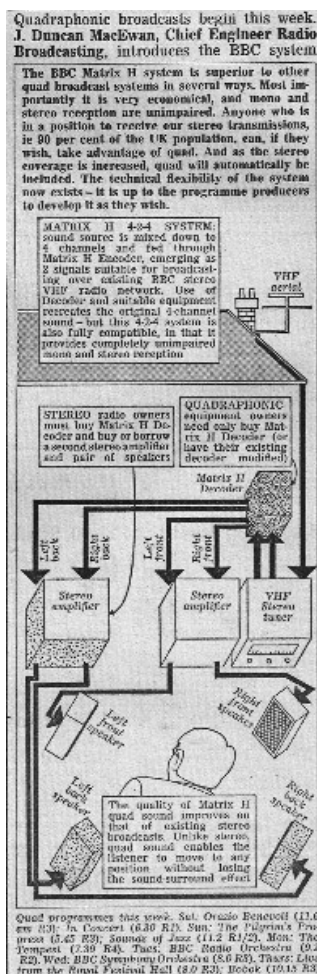
The overall spectrum of a CD-4 disc reached 45kHz or so, and to enjoy it you needed a cartridge with an extended upper response and a stylus profile that fitted the groove better. Most CD-4 compatible cartridges used the Shibata profile. Also necessary were a pick-up arm with low-capacitance connecting



Harry Nilsson's 'Nilsson Schmilsson' used the new CD-4 quadrasonic system to great effect.

leads, and a device called a CD-4 demodulator. The most popular stand-alone unit was JVC's 4DD5.

A CD-4 demodulator retrieved the four sum and difference channels, processing the latter with an ANRS decoder, and used a simple matrix arrangement to recover the four quad channels.



CD-4 was responsible for numerous innovations; apart from cartridges that tracked at ultrasonic frequencies, we got new hard-wearing materials (like RCA's 'Dynaflex') for pressing the records, and reduced-speed mastering.

Provided you looked after the records, CD-4 sounded fantastic; if you didn't – or some element of your system was lacking – you ended up with a rough sound. But here, at last, was a system that delivered quad the way the artist intended, with inter-channel separations of 20dB or more. That was used to great advantage by albums like Harry Nilsson's 'Nilsson Schmilsson'. The reduced-speed mastering also delivered positive results to stereo listeners.

Labels loyal to the CD-4 cause included Arista, Elektra, A&M, JVC, RCA, Atlantic and Warner. In the same 1974 US catalogue mentioned last month, 161 CD-4 releases were listed. In contrast, there were 255 titles released in the similarly-discrete four-channel Q8 – quadrasonic eight-track – medium. But artists were forced to put up with the quad LP systems to which their labels had committed.

And as if these incompatible

formats weren't enough, another was introduced in 1973. This was the UD-4 (Universal Disc, 4-channel) system developed in Japan by Nippon Columbia, better known in this country as Denon. UD-4 was claimed to deliver the best of both worlds. A UD-4 disc contained matrix-encoded quad audio (UMX) that could be decoded with basic equipment.

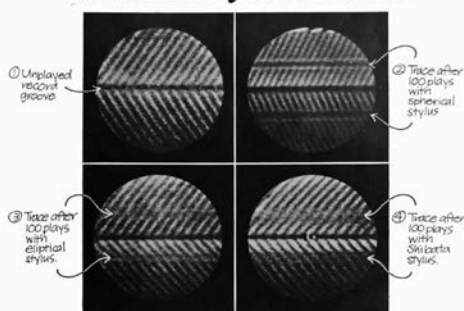
Nippon Columbia exploited new thinking (Ambisonics and clever base-band matrices) and went to a lot of trouble to ensure that UMX worked properly. But there was also a refined CD-4 like carrier-based signal (QMX). This could be extracted from the disc with a compatible decoder and cartridge of supersonic capability and, in conjunction with the BMX information, used to extract four discrete channels.

It may have been the most advanced four-channel disc format, but UD-4 simply arrived too late in the day. Only Nippon Columbia/Denon produced hardware – and the all-important UD-4 discs. The total inventory numbered less than 40.

A single decoder, Denon's UDA-100, made it to market. It connected to your turntable and was surprisingly popular because it could also decode CD-4 as well as SQ. And in the confusing and incompatible world of quadrasonics, an easy way of 'backing all horses' was welcome.

Next month, we examine quad's fall - and what became of it.

We used an electron microscope to prove to you a Shibata Stylus is the finest you can own.



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The AT 155 is one cartridge that will make every record in your collection sound better, whether SQ, QS, CM, stereo or mono. There are 4 other cartridges in our range with a Shibata stylus. Ask your hi-fi dealer for more details or write to us.

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For CD-4 replay a cartridge with an extended upper response was needed. Most used the Shibata profile - such as the one featured in this Audio-Technica advert.



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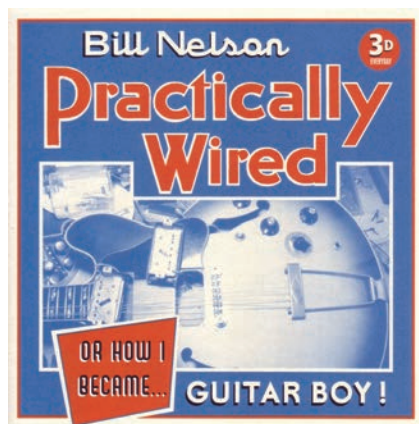
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BILL NELSON

PRACTICALLY WIRED (OR HOW I BECAME...GUITARBOY!)

ESOTERIC



"What you hear when you hear this album is a stream of ideas which just spilled from Nelson's head"

Bill Nelson holds an interesting yet rare position in the musical firmament. He might not be a superstar in terms of the general public but he has the respect of a host of dedicated fans and fellow musicians.

He is seen as an intelligent musician and is respected for it. Why else would the likes of David Sylvian, Harold Budd, Billy McKenzie, Roger Eno, Cabaret Voltaire and Yellow Magic Orchestra be happy to team up with him?

That word 'intelligence' crops up again and again and is oft associated with the man's lyrical content (which are full of often ironic references to topics like science fiction, Buddhism, mysticism, art and psychology). He is seen as an enigma, a mystery whose prodigious output does little to reveal or explain. Since leaving the band he founded, Be Bop Deluxe, the seventies glam/new wave/art rockers, Nelson's music has inhabited your basic LPs but he has also moved onwards from the usual published fare and entered new and challenging forums such as the theatre, art installations and exhibitions.

This album shows one aspect of the Nelson oeuvre. It is but one facet of the whole diamond – but it is one that is important to the Nelson aficionado because it stars the Nelson guitar. A side of the man that is beloved by any Nelson fan and one that is always in demand.

When he produced this piece of work in 1995, Nelson was – even then – approaching elder statesman level, but this post rock-like project proved to still be influential, as it touches on both edgy new wave but also verges over to lush ambient soundscapes.

It doesn't stop there, though, as it adds a selection of funky beats with added guitar hooks. The warm electronic accompaniment frames the inventive musical experiences that are sprinkled with found-sound vocal samples with – if you listen close – enough Gnostic religious moments included just to add to the curiosity and the grandeur.

The usual modern day album tends to take half of a lifetime to create. Creators tend to worry themselves over tiny detail. Chords are mulled, notes are teased apart and arrangements are agonised over. This album is not part of the pattern. In fact, compared

to many contemporary albums, this LP was completed with almost indecent haste. In fact, the album was created in just fourteen days in Fairview Studios back in 1994.

"Listening back to the album today" said Nelson, "I'm astonished that something with so much variety and complexity was created spontaneously in the studio without prior preparation. All I had was a general concept and a few titles. The rest appeared as if by magic".

Well, no, it wasn't magic. What you hear when you hear this album is a stream of ideas which just spilled from Nelson's head. This is why it took such a short time to create, because much of it had been fermenting with Nelson and emerged almost fully formed.

Nelson is still fond of the project, even though other instrumental albums of his have been released since 1995. "The album covers a variety of guitar styles and acts as a personal homage to guitars past, present and future".

So you can see how important the instrument is to him. How a part of his musical world that guitar is.

As for that intriguing album title? The source can be traced all the way back to the 1950s Practical Wireless magazines, a monthly publication devoted to the radio hobbyist.

"My father was a dedicated enthusiast" said Nelson. "Even building the family's first television set himself. He also bought my first guitars. The album is as much for him as for my early guitar inspirations".

Hence, this is not just a random selection of interconnected instrumental flavours, the ghost of his late father flows throughout the LP, connecting one track to another as he might have originally connected a piece of wire to a valve.

This is a work of love. His father supplies the rough material, the iron ore, if you will, which the guitar is the tool to fashion the ore into something beautiful.

Esoteric has released other Bill Nelson albums including his first solo LP from 1971, 'Northern Dreams' (the album that brought him to the attention of John Peel); the follow up to 'Practically Wired', 'After the Satellite Sings' from 1995 and 'Simplex' (2000) which features recordings made for the documentary film Henry Moore and Landscape. **PR**

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GENIUS



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The powerhouse GS150 stereo power amplifier, capable of 155W per channel and the GS175 integrated amplifier, combining many of the attributes of the preamp and power amp in a single chassis, and delivering 75W per channel.

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